



Project No. 3086-352-11-08
September 23, 2021

Mr. Chance Goodin
MC 124
Municipal Solid Waste Permits Section
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Re: Permit Modification – Leachate Phyto-Utilization System
Rock Prairie Road Landfill – TCEQ Permit No. MSW-1444C
Brazos County, Texas

Dear Mr. Goodin:

The purpose of this permit modification, submitted on behalf of Brazos Valley Solid Waste Management Agency, Inc., is to allow for the use of Leachate Management Specialists' Phyto-Utilization™ (Phyto-Utilization System) at the Rock Prairie Road Landfill. A detailed description of the Phyto-Utilization System is included in the attached Permit Modification.

One original and one copy are provided for your use and distribution. Consistent with Title 30 TAC §305.44 and §305.70(f), a signature page is included on page 5 of the attached TCEQ-20650 Form. Consistent with Title 30 TAC §305.70(f), a copy of this submittal was sent to the TCEQ regional office. A copy of this submittal was placed in the site operating record for this facility. Additionally, in accordance with the Title 30 TAC §330.59(h)(1), a \$150.00 application fee has been submitted to the TCEQ, as documented on page 1 of the TCEQ-20650 Form.

If you have any questions or require further information, please call.

Sincerely,

Weaver Consultants Group, LLC

A handwritten signature in black ink, appearing to read 'J. Edwards', is positioned above the typed name.

Jason A. Edwards, P.E.
Senior Engineer

Attachments: Appendix A – Permit Modification
Appendix B – TCEQ-20650 Form

cc: TCEQ Region 9 Office
Bryan Griesbach, BVSWMA, Inc.
Samantha Best, BVSWMA, Inc.

APPENDIX A
PERMIT MODIFICATION

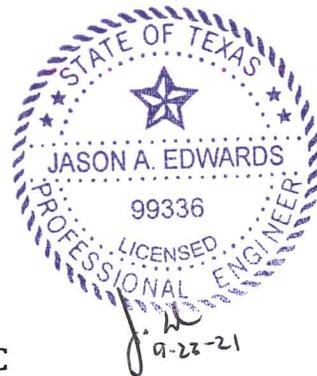
**ROCK PRAIRIE ROAD LANDFILL
BRAZOS COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1444C

PERMIT MODIFICATION

PHYTO-UTILIZATION SYSTEM**

Prepared for
Brazos Valley Solid Waste Management Agency, Inc.
September 2021

Prepared by
Weaver Consultants Group, LLC
TBPE Registration No F-3727
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Fort Worth, Texas 76109
817-735-9770



WCG Project No. 3086-352-11-03

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2.1	Description of Existing Phyto-Utilization System Area	2
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ATTACHMENT 1

Replacement Pages (Redline/Strikeout)

ATTACHMENT 2

Replacement Pages (Clean)



1 INTRODUCTION

The Rock Prairie Road Landfill (TCEQ Permit No. MSW-1444C) is an existing Type I Municipal Solid Waste Landfill located in Brazos County. The permitted limit of waste for the facility is approximately 98 acres, of which approximately 55 acres contain a Subtitle D compliant liner system and leachate collection system (the remaining 43 acres consists of a pre-Subtitle D liner system). The entire 98-acre waste footprint is currently covered by a permitted final cover system consisting of an 18-inch compacted clay infiltration layer and a 12-inch erosion layer. The facility completed closure activities in 2013 and entered post closure care in 2014.

A temporary authorization (TA) was submitted to the TCEQ and ultimately approved on November 4, 2019 which allowed for the operation of a phyto-utilization system on the top deck of the landfill over a Subtitle D portion of the landfill beginning on March 1, 2020. This TA was then extended for 180 days until February 28, 2021.

The following sections detail the construction of the phyto-utilization area, the results of the phyto-utilization system, and the request to permit the system on a permanent basis.

2 PHYTO-UTILIZATION SYSTEM

2.1 Description of Existing Phyto-Utilization System Area

Phyto-utilization is the use of fast-growing and non-invasive plants to consume liquid waste to greatly reduce or eliminate the need for other disposal methods in a green and sustainable way, as defined by Leachate Management Specialists, the company contracted by BVSWMA to design and install the system at the landfill. Vetiver grass is a non-invasive sterile plant that is able to uptake large volumes of liquid and utilize compounds in leachate as nutrients to fuel fast growth. Phyto-utilization using vetiver grass has proven successful in the management of leachate at other facilities in Texas and neighboring Gulf states.

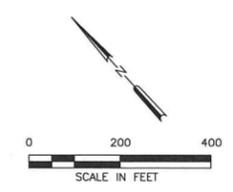
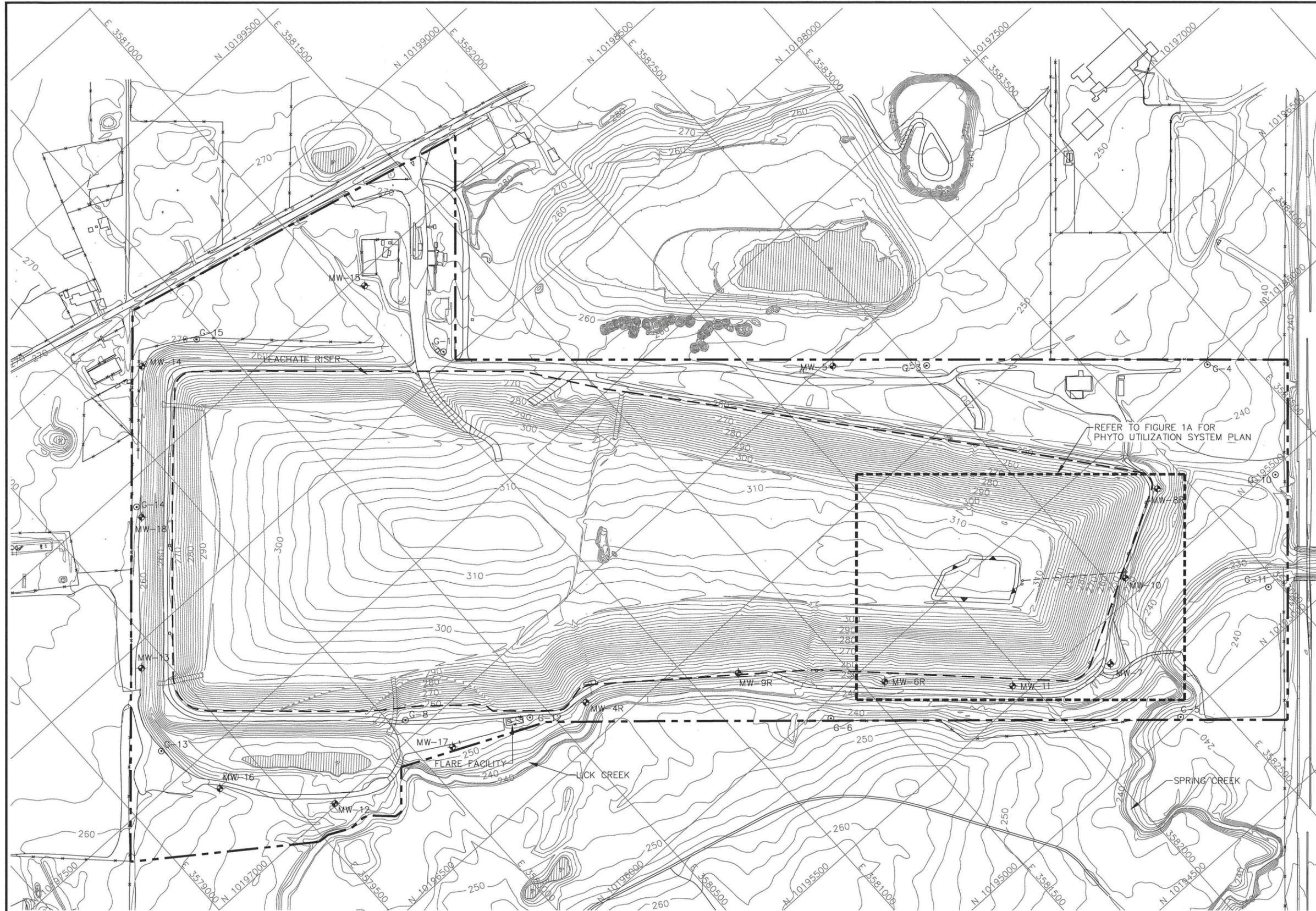
Installation of the phyto-utilization system at the landfill was completed by March 2020. A site plan showing the phyto-utilization pad relative to the landfill is shown on Figures 1 and 1A. The phyto-utilization system pad was constructed of 4 feet of soil over the existing final cover system.

The system consists of two dual-contained leachate storage tanks, an enclosed pretreatment and distribution system, supply piping, drip irrigation tubing, and vetiver grass. The drip irrigation system was installed approximately 18 inches below grade in the soil pad. Vetiver grass was planted in evenly spaced double rows along the drip tubing, as well as around the perimeter of the irrigated area to serve as a buffer. The rest of this pad was seeded with cover grass to further enhance evapotranspiration. A temporary freshwater sprinkler system was also installed to irrigate and establish the plants after planting, but has since been removed.

The existing control shed includes the control system that initiates the distribution of the leachate to the phyto-utilization area. This control system is equipped with a weather sensor to ensure that the phyto-utilization system will not operate during rainfall events. Excess leachate not transferred to the phyto-utilization area is directed to the existing leachate injection wells. Additional information on the system is included in the Proposed Revisions to the Leachate and Contaminated Water Plan.

2.2 Phyto-Utilization System Results

Between March 2020 and February 2021 the system operated as designed and consumed approximately 358,369 gallons of leachate. The vetiver plants showed



- LEGEND**
- PERMIT BOUNDARY
 - LIMITS OF WASTE
 - EXISTING CONTOUR (SEE NOTE 1)
 - N 10197000 STATE PLANE COORDINATE SYSTEM
 - PHASE BOUNDARY
 - ⊕ MW-4R EXISTING GROUNDWATER MONITORING WELLS
 - ⊙ G-4 EXISTING LANDFILL GAS MONITORING PROBE
 - FORCEMAIN



NOTE:
 1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS FROM AERIAL PHOTOGRAPHY FLOWN 11-04-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 1987.

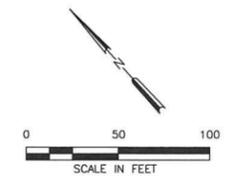
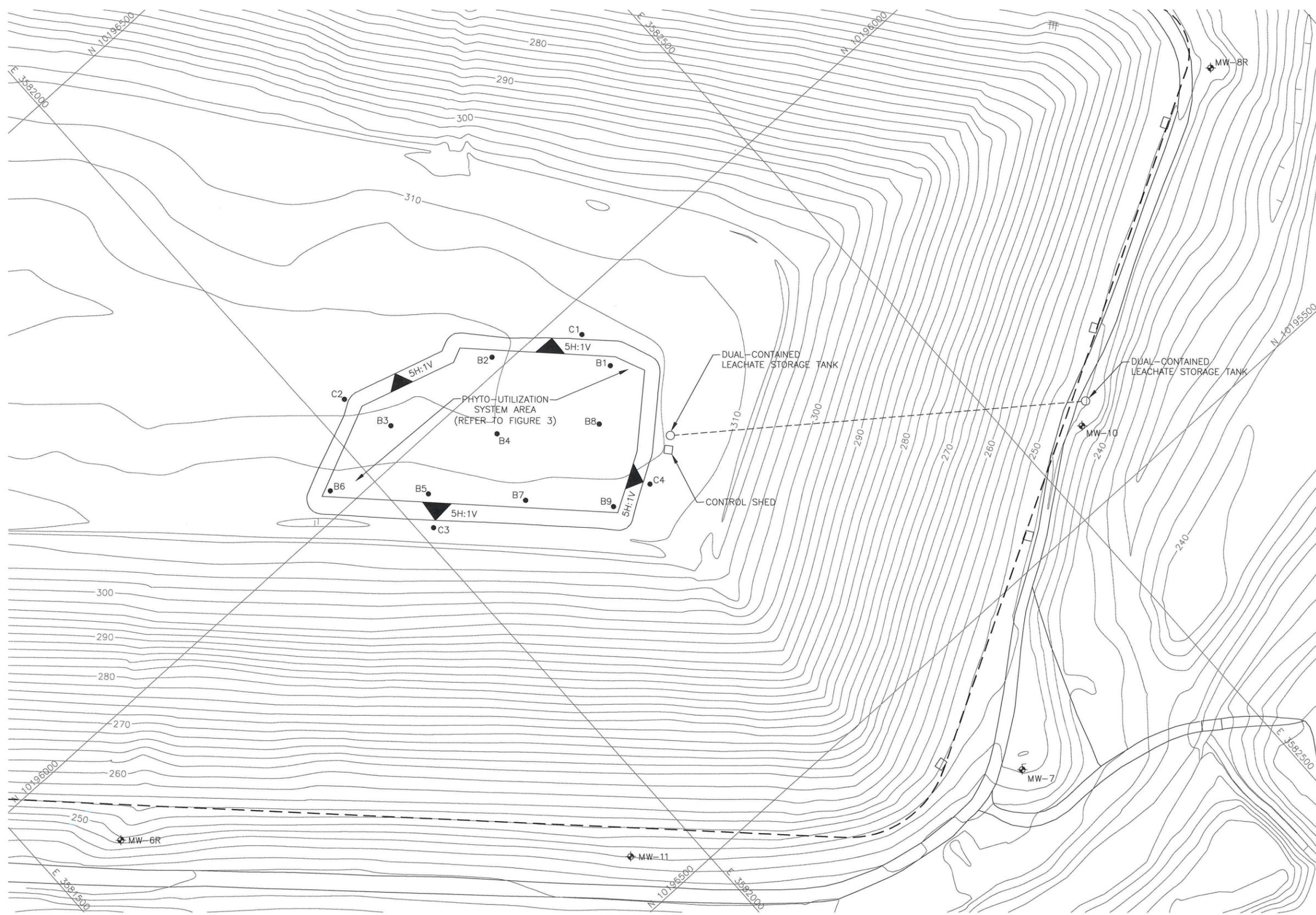
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<input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY	
<input type="checkbox"/> ISSUED FOR CONSTRUCTION	
DATE: 09/2021 FILE: 3086-352-11 CAD: FIG 1-SITE PLAN.DWG	DRAWN BY: SRF DESIGN BY: RCE REVIEWED BY: JAE
Weaver Consultants Group	
TBPE REGISTRATION NO. F-3727	

REVISIONS		
NO.	DATE	DESCRIPTION

**PERMIT MODIFICATION
 SITE PLAN**

ROCK PRAIRIE ROAD LANDFILL
 BRAZOS COUNTY, TEXAS

WWW.WCGRP.COM **FIGURE 1**



- LEGEND**
- LIMITS OF WASTE
 - 240 --- EXISTING CONTOUR (SEE NOTE 1)
 - N 10195500 STATE PLANE COORDINATE SYSTEM
 - ⊕ MW-10 EXISTING GROUNDWATER MONITORING WELLS
 - FORCEMAIN
 - B1 SAMPLE LOCATION

NOTE:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS FROM AERIAL PHOTOGRAPHY FLOWN 11-04-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 1987.



<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY <input type="checkbox"/> ISSUED FOR CONSTRUCTION	PREPARED FOR BRAZOS VALLEY SOLID WASTE MANAGEMENT AGENCY	PERMIT MODIFICATION PHYTO UTILIZATION SYSTEM PLAN													
DATE: 09/2021 FILE: 3086-352-11 CAD: FIG 1A-PHYTO UTILIZATION PLAN.DWG	DRAWN BY: SRF DESIGN BY: RCE REVIEWED BY: JAE	REVISIONS													
Weaver Consultants Group TBPE REGISTRATION NO. F-3727		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">NO.</th> <th style="width: 10%;">DATE</th> <th style="width: 80%;">DESCRIPTION</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	NO.	DATE	DESCRIPTION										ROCK PRAIRIE ROAD LANDFILL BRAZOS COUNTY, TEXAS
NO.	DATE	DESCRIPTION													
COPYRIGHT © 2019 BRAZOS VALLEY SOLID WASTE MANAGEMENT AGENCY, INC. ALL RIGHTS RESERVED.		WWW.WCGRP.COM	FIGURE 1A												

**LEACHATE PHYTO-UTILIZATION™ SYSTEM WITH VETIVER GRASS
BRAZOS VALLEY SOLID WASTE MANAGEMENT AGENCY
ROCK PRAIRIE ROAD LANDFILL – COLLEGE STATION, TEXAS**

Vetiver Planting



Vetiver Growth During Leachate Application



fast and healthy growth, quickly creating a fully established field as shown by the photographs on Figure 2.

In order to evaluate whether the phyto-utilization pad became contaminated by operation of the system, the TA and its extension required a soil sampling program to compare background concentrations with results after the TA periods. The TA required monitoring of the eight RCRA metals, Total Petroleum Hydrocarbons (TPH), and BTEX (Benzene, Toluene, Ethylbenzene, and Xylene). The background was to be determined using the 95 % upper tolerance limit (UTL) for each constituent. If the 95 % UTL background concentrations were exceeded at the end of the TA period, the landfill would be required to cease operation and decommission the system.

The first soil sampling event was conducted in September 2019 prior to leachate application for purpose of estimating background concentrations of constituents in cover soil. Soil samples were collected from nine points labeled B1 through B9, the locations of which are shown on Figure 1A. In accordance with the TA, the analytical results from these initial nine samples were used to calculate the 95% upper tolerance limits (UTL) to establish estimated background values for the tested constituents. A summary of the results and the 95% UTL is included on Table 1.

Four additional soil sampling events were conducted between July 2020 and January 2021 within the area of leachate application. Control samples were also collected from in-situ soils at four locations (C1 through C4) located outside of the irrigated area during three of these sampling events. The soils sampling results are summarized in the attached Table 2.

In summary, no TPH or BTEX constituents were detected above the Method Detection Limit (MDL) in any of the collected samples to date. Total arsenic, barium, chromium, lead, mercury, and selenium were detected at all sampled locations at low and varying concentrations, including in the control and background samples. Four sample points (B2, B3, B4, and B7) had reported total chromium and/or mercury concentrations greater than their respective UTL concentrations. Total chromium detected in control sample C1 outside of the irrigated area also exceeded the computed UTL in addition to exhibiting the highest total chromium concentration among all collected soil samples. None of the results show increasing or stable trends as a result of operation of the system and instead show significant variability between each sampling event. This variability indicates that the UTL method is not a reliable method to determine contamination by the system.

Alternatively, this permit modification proposes to implement a two-tiered compliance monitoring protocol that includes comparison of analytical results to a risk-based action level concentration coupled with verification resampling. An action level equal to 50 percent of the tier 1 Residential soil Protective Concentration Levels (PCLs) is proposed as an upper limit to the total metal concentrations detected in individual soil samples collected as part of routine soil

compliance monitoring. Additional information about this protocol is described in Appendix 5 of the revised Leachate and Contaminated Water Plan.

Table 1.
Baseline Soil Samples for BVS/WMA-RPRLF Phyto-Utilization Project

Boring	Date	Sample ID	Units	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Benzene	Toluene	Ethyl-benzene	Total Xylenes	TPH (nC12 to nC12)	TPH (nC12 to nC18)	TPH (nC18 to nC35)
B1	9/6/2019	PS1900	mg/Kg	2.43	88.3	< 0.629	6.42	13.1	0.0103	2.82	< 0.629	< 0.0064	< 0.0064	< 0.0064	< 0.0064	< 57.0	< 57.0	< 57.0
B2	9/6/2019	PS1901	mg/Kg	5.20	236	< 0.560	6.57	17.9	0.0195	1.83	< 0.560	< 0.0059	< 0.0059	< 0.0059	< 0.0059	< 64.0	< 64.0	< 64.0
B3	9/6/2019	PS1902	mg/Kg	3.27	711	< 0.545	4.24	12.2	0.0080	3.01	< 0.545	< 0.0052	< 0.0052	< 0.0052	< 0.0052	< 64.0	< 64.0	< 64.0
B4	9/6/2019	PS1903	mg/Kg	2.65	450	< 0.525	4.45	11.0	0.0135	2.30	< 0.525	< 0.0061	< 0.0061	< 0.0061	< 0.0061	< 57.0	< 57.0	< 57.0
B5	9/6/2019	PS1904	mg/Kg	12.9	1,610	< 0.562	5.90	12.6	0.0107	5.29	< 0.562	< 0.0053	< 0.0053	< 0.0053	< 0.0053	< 62.0	< 62.0	< 62.0
B6	9/6/2019	PS1905	mg/Kg	3.93	545	< 0.574	4.01	11.4	0.0118	3.04	< 0.574	< 0.0061	< 0.0061	< 0.0061	< 61.0	< 61.0	< 61.0	
B7	9/6/2019	PS1906	mg/Kg	2.95	421	< 0.536	4.51	9.73	0.0118	2.35	< 0.536	< 0.0054	< 0.0054	< 0.0054	< 56.0	< 56.0	< 56.0	
B8	9/6/2019	PS1907	mg/Kg	1.75	83.6	< 0.515	2.88	7.09	0.0081	1.06	< 0.515	< 0.0054	< 0.0054	< 0.0054	< 55.0	< 55.0	< 55.0	
B9	9/6/2019	PS1908	mg/Kg	3.23	438	< 0.544	3.00	9.55	0.0071	2.15	< 0.544	< 0.0062	< 0.0062	< 0.0062	< 58.0	< 58.0	< 58.0	

Calculated 95% Upper Tolerance Limit (UTL) to Establish Background Concentrations

Mean	4.26	509.2	0.554	4.66	11.6	0.0112	2.65	0.554	0.0058	0.0058	0.0058	0.0058	0.0058	0.0058	0.0058	59.3	59.3	59.3
k-value	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031	3.031
Std Dev	3.385	461.390	0.034	1.363	2.995	0.004	1.170	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.464	3.464	3.464
Samples (n)	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
95% UTL (mg/Kg)	14.52	1,908	0.656	8.80	20.70	0.0226	6.19	0.656	0.0071	0.0071	0.0071	0.0071	0.0071	0.0071	0.0071	69.8	69.8	69.8

95% upper tolerance limit (UTL)

$$UTL = x + ks$$

x = mean

s = standard deviation

k = one-sided tolerance factor (see Table I)

Statistical Background Calculations from TCEQ's

Use of Statistics for Determining Soil/ Groundwater Cleanup Levels under the Risk Reduction Rule:

Effective Date: April 30, 1998

Table 2. Historical Soil Samples for BVSWM-RRRLF Phyto-Utilization Project

Reefing	Date	Sample ID	Units	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver	Benzene	Toluene	Ethylbenzene	Total Xylenes	TPH (locat-cs1)	TPH (locat-cs2)	TPH (locat-cs3)	TPH (locat-cs4)
B1	9/6/2019	P51001	mg/kg	2.48	85.3	< 0.012	8.43	13.10	0.0101	2.87	< 0.029	< 0.0054	< 0.0054	< 0.0054	< 0.0015	< 57.0	< 57.0	< 57.0	< 57.0
	7/9/2020	P51000	mg/kg	3.19	87.7	0.007	7.33	13.90	0.0149	1.01	0.069	< 0.007	< 0.0059	< 0.0010	< 0.0015	< 11.0	< 15.0	< 15.0	< 15.0
	8/6/2020	P51009	mg/kg	3.30	375.0	0.143	4.42	10.60	0.0158	0.81	0.466	< 0.007	< 0.0059	< 0.0010	< 0.0014	< 9.1	< 12.0	< 12.0	< 12.0
	10/14/2020	P52022	mg/kg	3.26	318.0	0.143	4.27	11.30	0.0168	0.55	0.041	< 0.006	< 0.0059	< 0.0010	< 0.0012	< 9.5	< 12.0	< 12.0	< 12.0
1/27/2021	P52100	mg/kg	3.02	64.3	0.109	5.31	11.20	0.0088	0.73	0.038	< 0.007	< 0.0059	< 0.0010	< 0.0013	< 9.0	< 12.0	< 12.0	< 12.0	
B2	9/6/2019	P51901	mg/kg	5.20	236	< 0.050	6.37	17.90	0.0159	1.83	< 0.050	< 0.0059	< 0.0059	< 0.0010	< 0.0059	< 94.0	< 94.0	< 94.0	< 94.0
	7/9/2020	P52001	mg/kg	5.18	115	0.069	5.62	12.00	0.0253	0.56	0.027	< 0.006	< 0.0059	< 0.0010	< 0.0059	< 10.0	< 13.0	< 13.0	< 13.0
	8/6/2020	P52003	mg/kg	8.16	51.6	< 0.013	2.64	7.07	0.0176	0.51	0.018	< 0.005	< 0.0059	< 0.0006	< 0.0009	< 8.1	< 11.0	< 11.0	< 11.0
	10/14/2020	P52023	mg/kg	8.16	159	0.055	6.21	13.40	0.0176	0.55	0.026	< 0.005	< 0.0059	< 0.0006	< 0.0011	< 6.1	< 11.0	< 11.0	< 11.0
1/27/2021	P52101	mg/kg	4.63	1,260	0.109	6.18	11.40	0.0197	0.97	0.048	< 0.006	< 0.0059	< 0.0006	< 0.0012	< 11.0	< 14.0	< 14.0	< 14.0	
B3	9/6/2019	P51902	mg/kg	3.27	711	< 0.045	4.34	12.20	0.0080	1.01	< 0.045	< 0.006	< 0.0059	< 0.0010	< 0.006	< 64.0	< 64.0	< 64.0	< 64.0
	7/9/2020	P52002	mg/kg	4.30	45.6	< 0.012	14.80	12.90	0.0128	1.76	0.050	< 0.006	< 0.0059	< 0.0010	< 0.006	< 12.0	< 17.0	< 17.0	< 17.0
	8/6/2020	P52004	mg/kg	4.30	25.6	0.028	12.90	12.90	0.0218	1.76	0.050	< 0.006	< 0.0059	< 0.0010	< 0.006	< 14.0	< 14.0	< 14.0	< 14.0
	10/14/2020	P52024	mg/kg	2.88	431.0	0.067	5.10	12.70	0.0120	0.78	0.035	< 0.007	< 0.0059	< 0.0008	< 0.0013	< 10.0	< 14.0	< 14.0	< 14.0
1/27/2021	P52102	mg/kg	3.16	816.0	0.085	5.06	13.50	0.0162	0.65	0.042	< 0.007	< 0.0059	< 0.0008	< 0.0014	< 11.0	< 14.0	< 14.0	< 14.0	
B4	9/6/2019	P51903	mg/kg	1.63	430	< 0.025	4.43	11.00	0.0135	2.30	< 0.025	< 0.0061	< 0.0061	< 0.0054	< 0.0061	< 57.0	< 57.0	< 57.0	< 57.0
	7/9/2020	P52003	mg/kg	5.06	1,130	0.118	7.60	13.00	0.0105	0.24	0.024	< 0.008	< 0.010	< 0.0010	< 0.017	< 16.0	< 16.0	< 16.0	< 16.0
	8/6/2020	P52012	mg/kg	2.89	553	0.039	5.51	7.96	0.0249	0.81	0.032	< 0.006	< 0.008	< 0.0009	< 0.012	< 10.0	< 13.0	< 13.0	< 13.0
	10/14/2020	P52025	mg/kg	2.35	508	0.021	8.34	11.90	0.0221	1.28	0.074	< 0.006	< 0.0059	< 0.0008	< 0.0011	< 8.8	< 12.0	< 12.0	< 12.0
1/27/2021	P52103	mg/kg	2.75	491	0.059	7.65	10.70	0.0272	0.50	0.059	< 0.005	< 0.007	< 0.0008	< 0.0011	< 8.4	< 11.0	< 11.0	< 11.0	
B5	9/6/2019	P51904	mg/kg	12.9	1,610	< 0.062	3.90	12.80	0.0107	5.29	< 0.062	< 0.0059	< 0.0059	< 0.0008	< 0.0059	< 62.0	< 62.0	< 62.0	< 62.0
	7/9/2020	P52007	mg/kg	3.00	63.6	0.056	3.89	7.51	0.0092	0.23	0.021	< 0.006	< 0.007	< 0.008	< 0.012	< 6.4	< 11.0	< 11.0	< 11.0
	8/6/2020	P52016	mg/kg	2.87	44.9	< 0.032	2.45	6.37	0.0084	0.49	0.023	< 0.006	< 0.007	< 0.008	< 0.011	< 6.5	< 10.0	< 10.0	< 10.0
	10/14/2020	P52026	mg/kg	2.84	45.9	0.049	3.54	6.35	0.0105	0.55	0.028	< 0.005	< 0.007	< 0.007	< 0.010	< 7.7	< 10.0	< 10.0	< 10.0
1/27/2021	P52104	mg/kg	2.32	45.0	0.091	3.25	6.45	0.0067	0.28	0.021	< 0.005	< 0.006	< 0.007	< 0.010	< 7.7	< 10.0	< 10.0	< 10.0	
B6	9/6/2019	P51905	mg/kg	3.41	545	< 0.074	4.01	11.40	0.0118	3.04	< 0.074	< 0.0061	< 0.0061	< 0.0054	< 0.0061	< 61.0	< 61.0	< 61.0	< 61.0
	7/9/2020	P52008	mg/kg	4.50	43.5	0.038	5.86	12.40	0.0124	0.90	0.040	< 0.007	< 0.0013	< 0.0009	< 0.008	< 13.0	< 13.0	< 13.0	< 13.0
	8/6/2020	P52017	mg/kg	4.50	507	0.054	2.94	12.70	0.0045	0.85	0.019	< 0.005	< 0.007	< 0.0008	< 0.011	< 9.0	< 12.0	< 12.0	< 12.0
	10/14/2020	P52027	mg/kg	2.67	401	0.049	3.74	12.50	0.0087	0.49	0.025	< 0.005	< 0.006	< 0.0008	< 0.011	< 8.8	< 12.0	< 12.0	< 12.0
1/27/2021	P52105	mg/kg	2.64	897	0.066	4.84	13.10	0.006	1.03	0.034	< 0.006	< 0.007	< 0.0008	< 0.011	< 8.8	< 12.0	< 12.0	< 12.0	
B7	9/6/2019	P51906	mg/kg	2.85	421	< 0.036	4.31	9.70	0.0118	2.35	< 0.036	< 0.0054	< 0.0054	< 0.0054	< 0.0054	< 56.0	< 56.0	< 56.0	< 56.0
	7/9/2020	P52006	mg/kg	4.00	723	0.076	8.95	14.40	0.0467	0.82	0.056	< 0.007	< 0.008	< 0.009	< 0.013	< 13.0	< 13.0	< 13.0	< 13.0
	8/6/2020	P52015	mg/kg	2.49	130	0.051	4.15	8.01	0.011	0.70	0.030	< 0.005	< 0.006	< 0.007	< 0.010	< 7.8	< 10.0	< 10.0	< 10.0
	10/14/2020	P52028	mg/kg	3.41	217	0.064	8.97	13.30	0.0214	0.97	0.077	< 0.006	< 0.007	< 0.008	< 0.012	< 9.0	< 12.0	< 12.0	< 12.0
1/27/2021	P52106	mg/kg	3.60	811	< 0.033	8.80	11.70	0.0283	1.08	0.077	< 0.006	< 0.007	< 0.008	< 0.011	< 9.5	< 13.0	< 13.0	< 13.0	
B8	9/6/2019	P51907	mg/kg	1.79	85.6	< 0.015	2.88	7.09	0.0081	1.06	< 0.015	< 0.0054	< 0.0054	< 0.0054	< 0.0054	< 55.0	< 55.0	< 55.0	< 55.0
	7/9/2020	P52004	mg/kg	3.29	249	0.164	6.18	11.40	0.0104	0.39	0.031	< 0.0059	< 0.0059	< 0.0010	< 0.015	< 11.0	< 14.0	< 14.0	< 14.0
	8/6/2020	P52013	mg/kg	4.11	376	0.092	3.42	14.30	0.0084	1.18	0.030	< 0.005	< 0.006	< 0.007	< 0.012	< 9.4	< 12.0	< 12.0	< 12.0
	10/14/2020	P52029	mg/kg	2.29	361.8	0.059	5.05	16.20	0.0105	0.50	0.044	< 0.005	< 0.006	< 0.007	< 0.012	< 8.4	< 12.0	< 12.0	< 12.0
1/27/2021	P52107	mg/kg	2.56	321	0.104	5.25	11.60	0.0040	0.60	0.019	< 0.006	< 0.007	< 0.008	< 0.012	< 8.5	< 11.0	< 11.0	< 11.0	
B9	9/6/2019	P51908	mg/kg	3.23	438	< 0.044	3.00	9.55	0.0071	2.15	< 0.044	< 0.0062	< 0.0062	< 0.0062	< 0.0062	< 58.0	< 58.0	< 58.0	< 58.0
	7/9/2020	P52005	mg/kg	4.22	330	0.039	3.88	12.50	0.0089	0.50	0.020	< 0.007	< 0.008	< 0.010	< 0.014	< 10.0	< 13.0	< 13.0	< 13.0
	8/6/2020	P52014	mg/kg	4.33	301	0.086	2.84	11.40	0.0089	1.13	0.021	< 0.005	< 0.006	< 0.007	< 0.010	< 7.5	< 9.9	< 9.9	< 9.9
	10/14/2020	P52030	mg/kg	3.40	601	0.042	4.03	13.50	0.0109	0.66	0.020	< 0.006	< 0.007	< 0.0008	< 0.011	< 8.6	< 11.0	< 11.0	< 11.0
1/27/2021	P52108	mg/kg	2.82	375	0.089	3.12	13.50	0.0080	0.60	0.020	< 0.006	< 0.007	< 0.0008	< 0.012	< 9.7	< 13.0	< 13.0	< 13.0	
C1	8/12/2020	P52018	mg/kg	3.08	310	0.113	3.96	8.42	0.0173	0.78	0.053	< 0.006	< 0.007	< 0.008	< 0.012	< 8.8	< 12.0	< 12.0	< 12.0
	10/14/2020	P52031	mg/kg	6.44	70.9	0.053	32.70	17.00	0.0180	1.58	0.046	< 0.007	< 0.008	< 0.009	< 0.013	< 11.0	< 14.0	< 14.0	< 14.0
	1/27/2021	P52109	mg/kg	2.30	43.4	0.068	3.84	7.91	0.0140	0.24	0.031	< 0.006	< 0.007	< 0.008	< 0.011	< 6.2	< 11.0	< 11.0	< 11.0
	9/12/2020	P52019	mg/kg	4.92	603	0.173	4.74	14.20	0.0193	3.11	0.045	< 0.007	< 0.008	< 0.009	< 0.013	< 9.3	< 12.0	< 12.0	< 12.0
10/14/2020	P52032	mg/kg	2.46	603	0.059	5.64	11.30	0.0149	0.81	0.044	< 0.006	< 0.007	< 0.008	< 0.010	< 7.7	< 10.0	< 10.0	< 10.0	
1/27/2021	P52110	mg/kg	2.92	371	< 0.013	6.17	10.30	0.0089	0.57	0.034	< 0.006	< 0.007	< 0.008	< 0.010	< 7.6	< 11.0			

3 PERMIT MODIFICATION JUSTIFICATION

It is requested that this permit modification be processed per 30 TAC §305.70(l) without public notice, as the modification does not readily appear in 30 TAC §305.70(j) or 30 TAC §305.70(k).

The proposed permit modification meets the provisions of 30 TAC §305.70(d), as the changes do not substantially alter the permit conditions and do not reduce the capability of the facility to protect human health and the environment, as demonstrated within the permit modification.

ATTACHMENT 1
REPLACEMENT PAGES
(REDLINE/STRIKEOUT)

**ROCK PRAIRIE ROAD LANDFILL
BRAZOS COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1444C**

PERMIT MODIFICATION

**PART III
ATTACHMENT 12
FINAL CLOSURE PLAN**

Prepared for
Brazos Valley Solid Waste Management Agency, Inc.

October 2001

Revised September 2021



Prepared by

Weaver Consultants Group, LLC
TBPE Registration No F-3727
6420 Southwest Blvd., Suite 206
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WCG Project No. 3086-352-11-03

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7.0 ESTIMATED COSTS

Table 12-1 summarizes the estimated costs for final closure of the largest area requiring final cover. The estimated costs will be updated annually or as required to reflect any increased costs in construction or materials. A copy of the revised closure costs will be submitted to the Executive Director of the TNRCC TCEQ. Table 12-2 summarizes the estimated costs for final closure of the phyto-utilization area.

**Table 12-1
Closure Costs**

Description	Quantity	Unit	Unit Costs	Total Costs
Engineering				
Topographic Survey	1	LS	\$5,000	\$5,000
Boundary Survey	50	HR	\$80	\$4,000
Site Evaluation	1	LS	\$15,000	\$15,000
Development of Closure Plan	1	LS	\$15,000	\$15,000
Contract Administration	1	LS	\$5,000	\$5,000
Administrative Costs	1	LS	\$5,000	\$5,000
Closure Inspection	370	HR	\$80	\$29,600
Testing		LS		\$30,000
Permit Compliance Package	1	LS	\$5,000	\$5,000
Engineering Total				\$83,600
Construction				
Pre-Subtitle D 31 Acre Area				
Soil Cover	28,257	CY	\$3.25	\$85,335
Clay Cap	78,771	CY	\$5.25	\$413,548
Re-vegetation	31	Acres	\$1,000	\$31,000
Site Grading and Drainage	31	Acres	\$500	\$15,500
Subtitle D 53 Acre Area				
Soil Cover	179,564	CY	\$3.25	\$583,583
Clay Cap	134,673	CY	\$5.25	\$707,033
Synthetic Membrane	2,424,114	SF	\$0.50	\$1,212,057
Drainage Layer	2,424,114	SF	\$0.42	\$1,018,128
Re-vegetation	53.0	Acres	\$1,000	\$53,000
Site Grading and Drainage	53.0	Acres	\$500	\$26,500
Construction Total				\$4,145,684
Subtotal				\$4,229,284
Contingency 15%				\$634,393
Closure Total				\$4,898,177

**TABLE 12-2
ROCK PRAIRIE ROAD LANDFILL - PHYTO-UTILIZATION AREA CLOSURE COST**

Description	Quantity	Unit ¹	Unit ² Cost	Total Cost	Comments
1.0 ENGINEERING					
1.1 Development of Plans	1.0	LS	\$ 5,000	\$ 5,000	Includes third party preparation of final cover design and construction plans including specifications (includes grading, drainage, and revegetation).
1.2 Closure Inspection and Testing	1.0	LS	\$ 7,500	\$ 7,500	Includes third party inspection during closure construction, thickness and permeability verifications, survey, and preparation of closure report.
ENGINEERING TOTAL			\$	12,500	
2.0 CONSTRUCTION					
2.1 Testing of Phyto Utilization System Area Soil	1	LS	8,500	\$ 8,500	Includes sampling, shipping, laboratory analysis and technical review of results of samples collected at six locations of 100-foot by 100-foot grid across the phyto utilization system area. Four samples collected at each sample location (2 in phyto utilization pad, and 2 in underlying erosion layer and infiltration layer).
2.2 Removal of Contaminated Soil (If Required)	13,310	CY	\$ 15.00	\$ 199,650	Includes excavation and hauling of soil to Twin Oaks Landfill for disposal.
2.3 Final Cover System					
2.3.1 Infiltration Layer	3,025	CY	\$ 5.00	\$ 15,125	Includes excavation, hauling, and construction of a 1.5-foot thick clay material infiltration layer over the phyto utilization system area.
2.3.2 Erosion Layer	2,017	CY	\$ 2.50	\$ 5,042	Includes excavation, hauling, and construction of a 1-foot thick earthen material erosion layer over entire closure area.
2.4 Revegetation	1.5	AC	\$ 2,000	\$ 3,000	Includes vegetation of completed cover and general fill via seeding and application of fertilizer over the area requiring final cover.
2.5 Removal of Onsite Storage Tanks	1	LS	\$ 2,000	\$ 2,000	Includes the cost for removal and disposal of the two leachate storage tanks associated with the phyto utilization system.
CONSTRUCTION TOTAL				\$ 233,317	
ENGINEERING & CONSTRUCTION SUBTOTAL				\$ 245,817	
3.0 CONTINGENCY			10%	\$ 24,582	
4.0 CONTRACT PERFORMANCE BOND			1.5%	\$ 3,687	
5.0 LEGAL FEES		LS		\$ 5,000	
6.0 TCEQ ADMINISTRATION OF CONTRACTS		LS		\$ 5,000	
TOTAL CLOSURE COST				\$ 284,086	

¹LS = Lump Sum, AC = acres, CY = cubic yards.

²Unit Costs are in 2021 dollars. Unit costs are based on current market conditions, typical engineering costs, and industry standards related to construction and reflect input from BVSWMA, Inc. and Weaver Consultants Group, LLC.



**ROCK PRAIRIE ROAD LANDFILL
BRAZOS COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1444C**

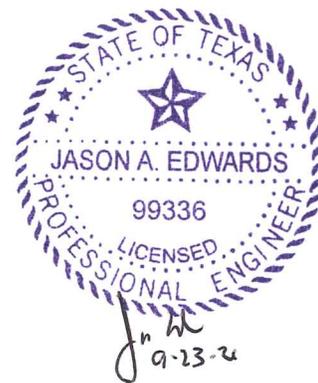
PERMIT MODIFICATION

**PART III
ATTACHMENT 15
LEACHATE AND CONTAMINATED WATER PLAN**

Prepared for

Brazos Valley Solid Waste Management Agency, Inc.

Revised September 2021



Prepared by

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WCG Project No. 3086-352-11-03

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ATTACHMENT 1

Figures

ATTACHMENT 2

Effluent Disposal by Vetiver Irrigation Report



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4.5.1 Conveyance by Tanker Truck

Leachate may be withdrawn from the collection sumps and placed into tanker trucks. Spill containment for truck hose connection and loading will be provided by a portable trough or similar spill containment. Protection will be provided at hose connection locations. Leachate will be transported to an authorized and permitted facility for treatment and disposal.

4.6 LEACHATE STORAGE

Leachate storage is not proposed for the site at this time. Temporary storage may be provided in the future.

4.7 LEACHATE TREATMENTS AND DISPOSAL

Tanker trucks will collect the leachate that has accumulated in the sumps and transport it to a permitted WWTP. All leachate transferred to the WWTP will be handled in compliance with TCEQ requirements. Additionally, a phyto-utilization system may be implemented for the onsite use of leachate by vetiver grass (refer to Appendix 5 for additional information).

Leachate may also be recirculated at the landfill. This process involves taking leachate from the sumps, and pumping it back into the waste. Recirculation will only take place on areas of the landfill that have Subtitle D liner systems.

**ROCK PRAIRIE ROAD LANDFILL
BRAZOS COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1444C**

PERMIT MODIFICATION

PART III

ATTACHMENT 15

APPENDIX 5

PHYTO-UTILIZATION SYSTEM INFORMATION

Prepared for

Brazos Valley Solid Waste Management Agency, Inc.

September 2021



Prepared by

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WCG Project No. 3086-352-11-03

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ATTACHMENT 1

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Effluent Disposal by Vetiver Irrigation Report



1 INTRODUCTION

The Rock Prairie Road Landfill (TCEQ Permit No. MSW-1444C) is an existing Type I Municipal Solid Waste Landfill located in Brazos County. The permitted limit of waste for the facility is approximately 98 acres of which approximately 55 acres contain a Subtitle D compliant liner system and leachate collection system (the remaining 43 acres consists of a pre-Subtitle D liner system). The entire 98-acre waste footprint is currently covered by a permitted final cover system consisting of an 18-inch compacted clay infiltration layer and a 12-inch erosion layer.

A temporary authorization was approved in November 2019 which allowed for the construction and operation of the phyto-utilization system on a temporary basis. The phyto-utilization system is located over a portion of the Subtitle D lined portion of the waste footprint. Specifically, the phyto-utilization system includes a subsurface drip irrigation system combined with strategic plantings of vetiver grass to “dispose” of leachate generated onsite and use the leachate as a beneficial resource to help plants grow. The only leachate to be treated will be leachate generated at the Rock Prairie Road Landfill.

Vetiver grass is a non-invasive plant that has a high demand for moisture and nutrients (both provided by leachate). Vetiver grass has proven to be successful in the management of leachate in other facilities in Texas. By utilizing the ability of the vetiver grass to consume the leachate distributed through the drip irrigation system the facility can capitalize on the natural ability of the grass to utilize both the moisture and nutrients from the leachate.

Prior to development and approval of the temporary authorization, BVSWMA contracted with Leachate Management Specialists (LMS) to review the site conditions to determine if phyto-utilization would be an advantageous option for the Rock Prairie Road Landfill. LMS reviewed various site information including existing climate data, onsite soil quality, and site specific leachate chemistry and concluded that phyto-utilization would be a suitable option for leachate disposal. As part of this review, LMS (in coordination with Veticon Consulting) prepared an effluent disposal by vetiver irrigation (EDVI) evapotranspiration model to determine the area needed to consume the site’s average annual leachate volume. A summary of LMS’s findings and the EDVI model is included in Attachment 2. This model concluded that approximately 0.6 acres would be needed to consume the site’s average annual leachate volume. To provide for a conservative approach, LMS recommended that a 1-acre phyto-utilization system be installed.

2 PROPOSED PHYTO-UTILIZATION SYSTEM

2.1 Description of Phyto-Utilization System Area

As discussed in Section 1, the waste footprint at the Rock Prairie Road Landfill is currently covered with a final cover system consisting of an 18-inch compacted clay layer and a 12-inch erosion layer. A current site plan of the facility is shown on Figure 1 (Attachment 1). The phyto-utilization system area was constructed by installing an additional 4 feet of soil on the portion of the existing top deck of the landfill (over a Subtitle D compliant liner system). This area was transitioned back to existing grade at a maximum 5H:1V slope.

2.2 Phyto-Utilization System Design

The phyto-utilization system consists of two dual contained leachate storage tanks, a control shed, a drip irrigation system, a series of vetiver grass plantings around the drip irrigation system, and a series of vetiver grass plantings around the perimeter of the drip irrigation system. The layout of the phyto-utilization system is included on Figure 1A.

Leachate from the site is currently directed from the existing leachate collection sumps to existing leachate injection wells located on the Subtitle D portions of the landfill through a series of pumps. With this phyto-utilization system, leachate is pumped from the existing leachate collection sump via forcemain to a dual contained leachate storage tank (maximum 2,000-gallon capacity) located at the eastern portion of the site. Leachate is then pumped via forcemain to the dual contained leachate storage tank (maximum 6,000-gallon capacity) located adjacent to the phyto-utilization system area.

The system consists of the dual-contained leachate storage tanks and enclosed pre-treatment and distribution system, supply piping, drip irrigation tubing, and vetiver grass. A drip irrigation system was installed approximately 18 inches below grade in the soil pad. Vetiver grass was planted in evenly spaced double rows along the drip tubing, as well as around the perimeter of the irrigated area to serve as a buffer. The rest of the pad was seeded with cover grass to further enhance evapotranspiration. The layout and details for the irrigation system and vetiver grass plantings is shown on Figures 2 and 3.

The control shed includes the control system that initiates the distribution of the leachate to the phyto-utilization area. This control system is equipped with a weather sensor to ensure that the phyto-utilization system will not operate during rainfall events. Excess leachate not transferred to the phyto-utilization area is directed to the existing leachate injection wells.

2.3 Phyto-Utilization System Maintenance

Maintenance will be conducted throughout the use of the phyto-utilization system. The control system will include a notification system that will notify personnel of any alarms or automatic shutdown of the distribution system. In addition, regular inspections and maintenance of the control and distribution system will occur. Equipment repairs, replanting, and mowing will occur as necessary based on actual site conditions.

2.4 Phyto-Utilization System Monitoring

The behavior of metals in soils is affected by a multitude of highly complex geochemical processes influenced by soil composition, structure, saturation, temperature, degree of heterogeneity, etc. The continuous interaction of these processes can make it difficult to establish an accurate background concentration limit without collecting and testing an abundance of statistically independent background samples intermittently over an extended period of time. This is due to the variability of natural geochemical processes including stratification and seasonality among others.

For these reasons, a two-tiered compliance monitoring protocol is proposed that includes comparison of analytical results to a risk-based action level concentration coupled with verification resampling. An action level equal to 50 percent of the Tier 1 Residential Soil PCLs is proposed as an upper limit to the total metals concentrations detected in individual soil samples collected as part of routine pad soil compliance monitoring. This action-level facilitates the use of established human health exposure risk-based standards for soil data comparison. Using 50 percent of the PCL concentration establishes a conservative risk-based threshold for evaluating total metals concentrations in the pad soils. In the event that a metal concentration exceeds 50 percent the PCL, the facility will conduct resampling within 90 days to either verify or disconfirm the initial apparent exceedance. This verification resampling strategy is similar to the 1 of 2 testing strategy used in many aqueous sampling statistical protocols and is designed with the purpose of reducing false positives in analytical testing results. If an exceedance is verified by the resampling results, the facility will notify TCEQ in writing and provide a proposed course of action in response to the exceedance. It is noted that because the threshold for an exceedance equates to 50 percent the PCL concentration, identification of an exceedance does not necessarily have any direct regulatory implications. However, the facility may cease leachate application while consulting with TCEQ to establish a proposed course of action.

Volatile organic compounds (VOCs) are not commonly naturally occurring in surface soils. TPH and BTEX constituents have not been detected at or above the method detection limit (MDL) in any of the collected soil samples to-date. Therefore, the MDL is proposed as a highly conservative action level for TPH and BTEX. This strategy is similar to the double quantification rule (DQR) used in many aqueous sampling statistical protocols.

In the event that TPH or BTEX constituents are detected at or above the MDL, the facility will firstly conduct resampling within 90 days to verify or disconfirm the initial apparent exceedance. If an exceedance is confirmed by the resampling results, the facility will notify TCEQ in writing and provide a proposed course of action in response to the exceedance in the same manner as described for a metals exceedance.

Soil sampling will be conducted on a semiannual frequency. The following summarized the soil sampling and evaluation procedures:

- A 100-foot by 100-foot sampling grid will be established across the phyto-utilization area.
- Soil samples will be obtained within each grid area and collected from a depth of 3-feet below surface grade which equates to 1 foot above the bottom of the phyto-utilization soil pad fill.
- Soil samples will be analyzed for the eight RCRA total metals, Total Petroleum Hydrocarbons (TPH), and BTEX constituents (benzene, toluene, ethylbenzene, and xylenes) by a NELAC-certified environmental testing laboratory accredited in the state of Texas.
- The testing results will be filed in the facility's Site Operating Record within 90 days of sampling.
- Any TPH or BTEX constituent that is detected at or above the MDL will be considered an exceedance.
- The total metal analytical results will be compared to the action levels listed in Table 1 which equate to 50% the Tier 1 residential soil PCLs.
- If an action level is exceeded by an individual soil sample's analytical concentration, verification resampling will be conducted. The facility will resample the location within 90 days of the soil sampling date for the analytical concentration exhibiting the unverified exceedance.
- If the resampling results do not verify the initial apparent action level exceedance, the facility will document the results in the SOR and no further action will be required.
- If the initial exceedance is verified by the resampling results, the facility will notify TCEQ in writing within 14 days of the exceedance verification. The notification submittal will include a copy of the laboratory analytical testing reports and a recommendation for a proposed course of action.

**Table 1
Action Levels for Total Metals**

Constituent	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)
Tier 1 Residential Soil PCL	24	8,100	52	33,000	500	3.6	310	97
Action Level (50% the PCL)	12	4,050	26	16,500	250	1.8	155	48.5

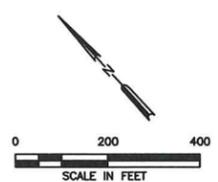
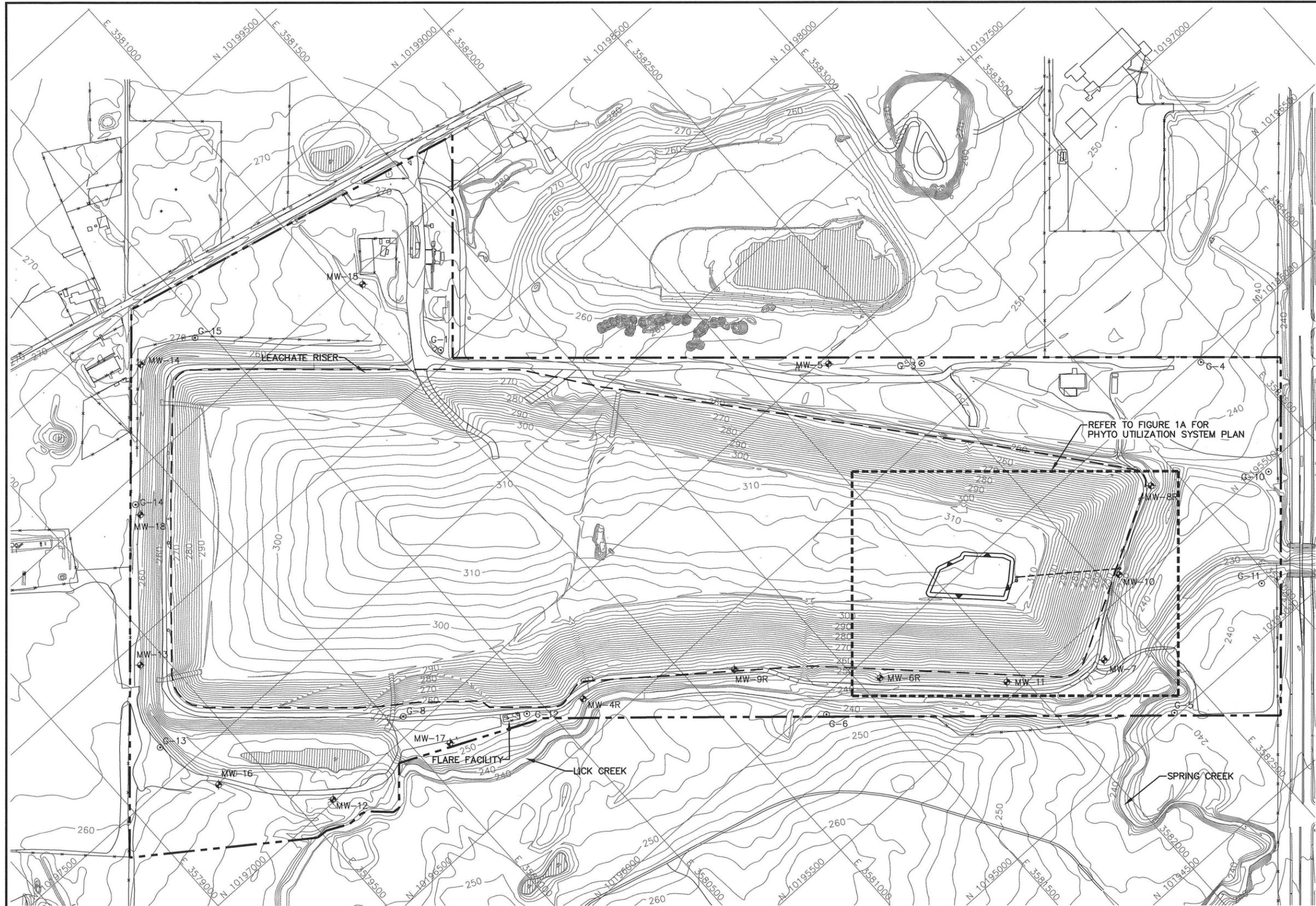
3 DECOMMISSIONING OF PHYTO-UTILIZATION SYSTEM

Prior to excavating and/or disposing of phyto-utilization soils and plantings, laboratory testing will be performed of the soils to determine their suitability for use as clean soil fill or for off-site disposal into a permitted landfill. Soil sampling and testing procedures will be conducted in the same manner as the semiannual compliance monitoring discussed in Section 2.4.

Any required removal of the final cover system will be repaired consistent with the permitted Final Cover Quality Control Plan. Soils (and vegetative cover) found to be below action level concentrations will be either left in place or regraded (if necessary) to ensure positive drainage is maintained. Refer to Attachment 12 for the phyto-utilization system closure cost.

ATTACHMENT 1

FIGURES



- LEGEND**
- PERMIT BOUNDARY
 - LIMITS OF WASTE
 - EXISTING CONTOUR (SEE NOTE 1)
 - N 10197000 STATE PLANE COORDINATE SYSTEM
 - PHASE BOUNDARY
 - ⊕ MW-4R EXISTING GROUNDWATER MONITORING WELLS
 - ⊙ G-4 EXISTING LANDFILL GAS MONITORING PROBE
 - FORCEMAIN

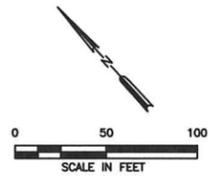
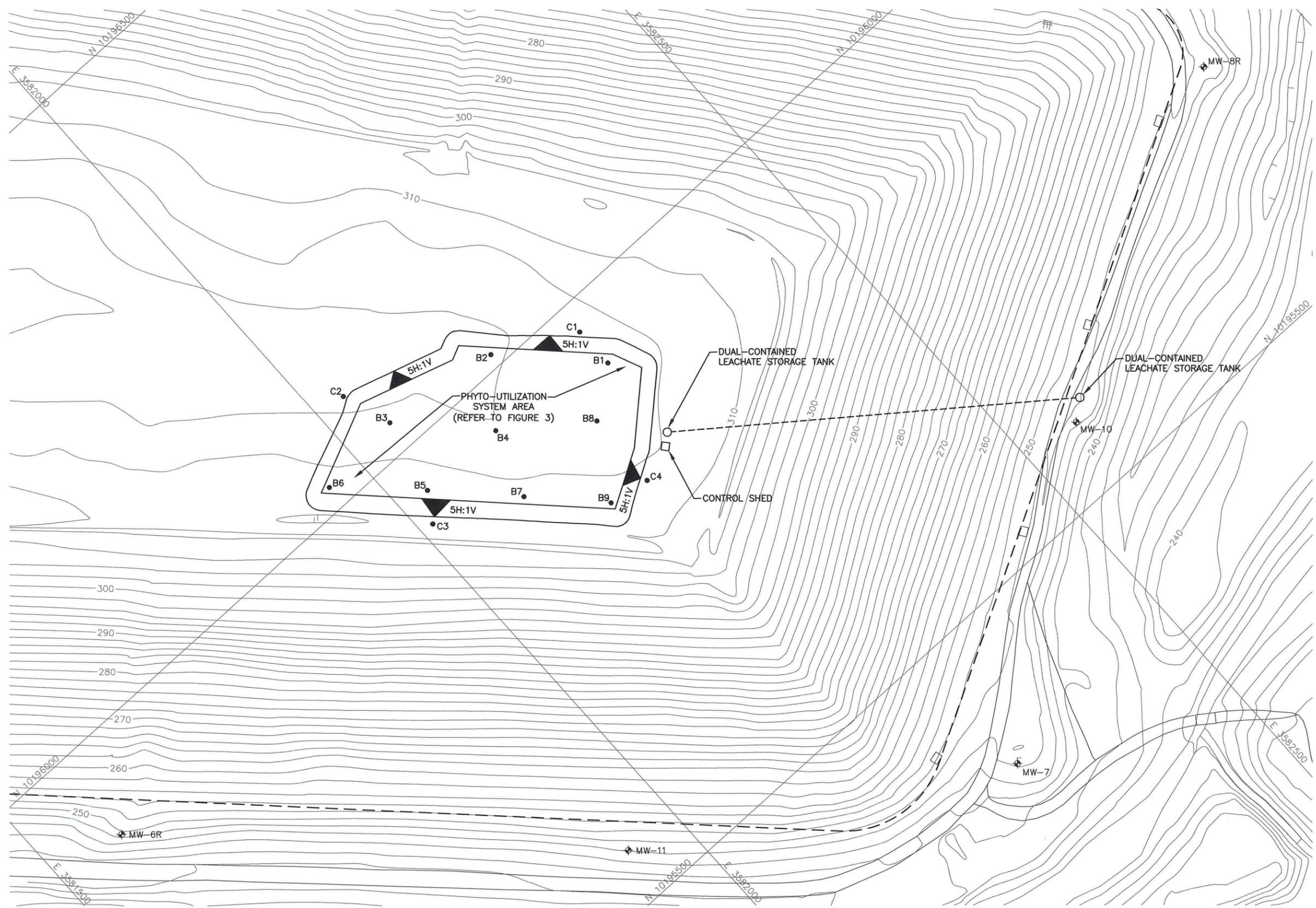


NOTE:

- EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS FROM AERIAL PHOTOGRAPHY FLOWN 11-04-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 1987.

O:\3086\352\PHYTO SYSTEM MOD\FIG 1-SITE PLAN.dwg, jwilson, 1:2

<input type="checkbox"/> DRAFT <input checked="" type="checkbox"/> FOR PERMITTING PURPOSES ONLY <input type="checkbox"/> ISSUED FOR CONSTRUCTION	PREPARED FOR BRAZOS VALLEY SOLID WASTE MANAGEMENT AGENCY		PERMIT MODIFICATION SITE PLAN ROCK PRAIRIE ROAD LANDFILL BRAZOS COUNTY, TEXAS	
	DATE: 09/2021 FILE: 3086-352-11 CAD: FIG 1-SITE PLAN.DWG	DRAWN BY: SRF DESIGN BY: RCE REVIEWED BY: JAE		
Weaver Consultants Group TBPE REGISTRATION NO. F-3727		NO. DATE DESCRIPTION	WWW.WCGRP.COM FIGURE 1	



- LEGEND**
- LIMITS OF WASTE
 - 240--- EXISTING CONTOUR (SEE NOTE 1)
 - N 10195500 STATE PLANE COORDINATE SYSTEM
 - ⊕ MW-10 EXISTING GROUNDWATER MONITORING WELLS
 - FORCEMAIN
 - B1 SAMPLE LOCATION

NOTE:

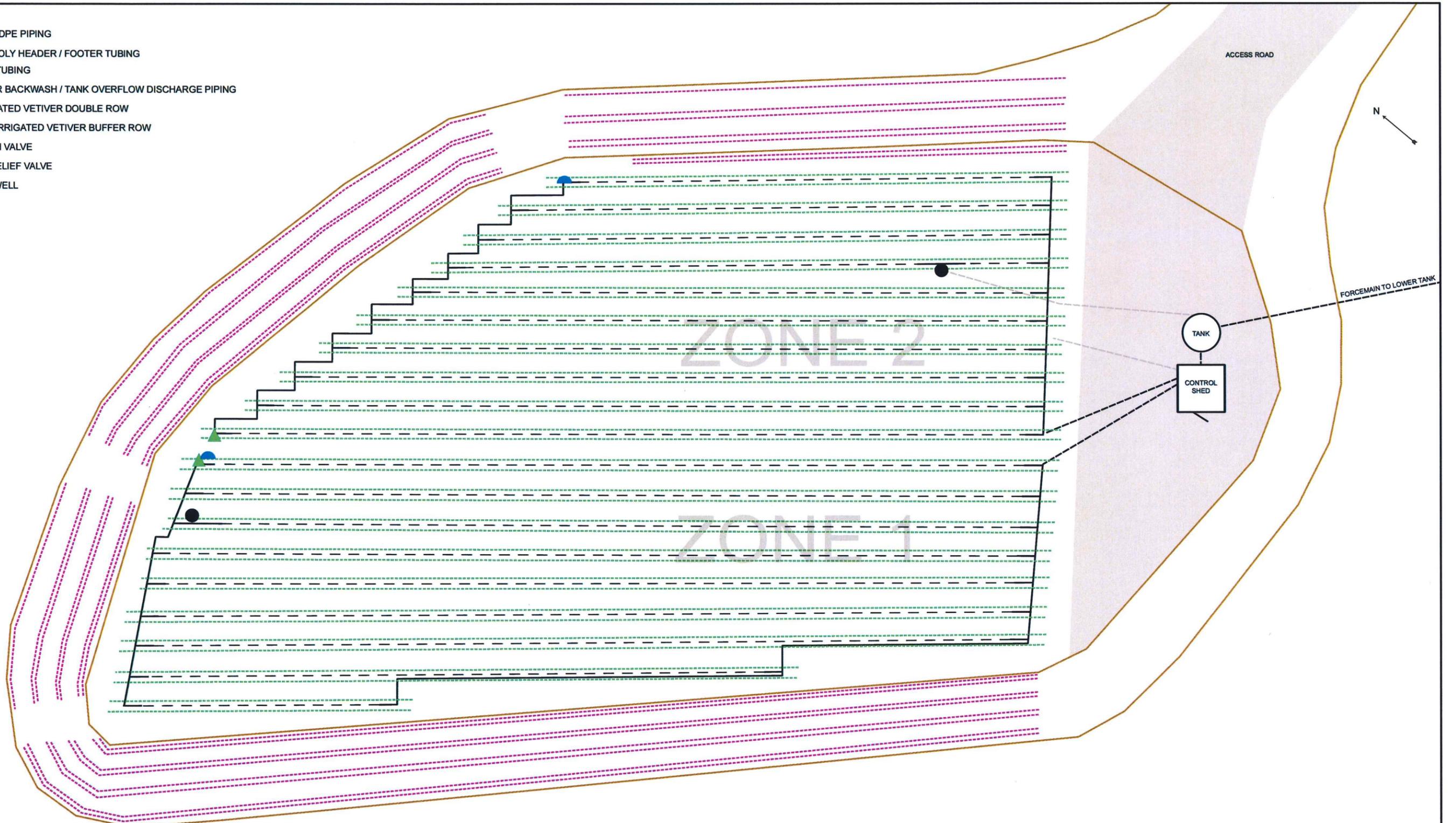
1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS FROM AERIAL PHOTOGRAPHY FLOWN 11-04-2010. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NAD 1987.



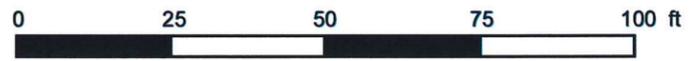
O:\3086\352\PHYTO SYSTEM MOD\FIG 1A-PHYTO UTILIZATION SYSTEM PLAN.dwg, jwilson, 1:2

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DATE: 09/2021 FILE: 3086-352-11 CAD: FIG 1A-PHYTO UTILIZATION PLAN.DWG	DRAWN BY: SRF DESIGN BY: RCE REVIEWED BY: JAE	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="3">REVISIONS</th> </tr> <tr> <th style="width: 10%;">NO.</th> <th style="width: 10%;">DATE</th> <th style="width: 80%;">DESCRIPTION</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>	REVISIONS			NO.	DATE	DESCRIPTION									
REVISIONS																	
NO.	DATE	DESCRIPTION															
Weaver Consultants Group TBPE REGISTRATION NO. F-3727		WWW.WCGRP.COM FIGURE 1A															

- 2" Ø HDPE PIPING
- 1" Ø POLY HEADER / FOOTER TUBING
- - - - - DRIP TUBING
- - - - - FILTER BACKWASH / TANK OVERFLOW DISCHARGE PIPING
- IRRIGATED VETIVER DOUBLE ROW
- NON-IRRIGATED VETIVER BUFFER ROW
- ▲ FLUSH VALVE
- AIR RELIEF VALVE
- GAS WELL

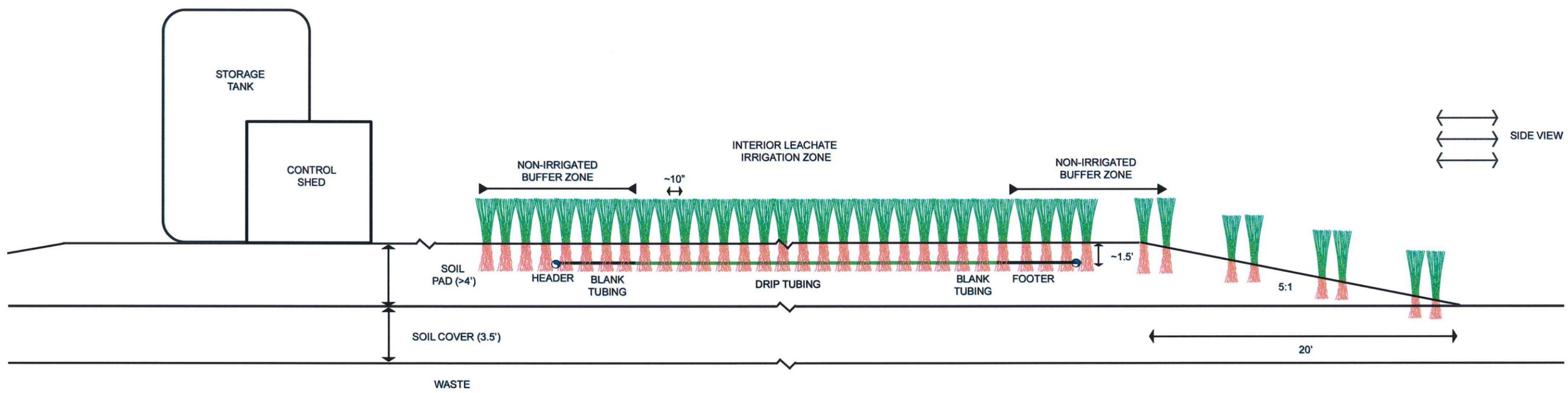
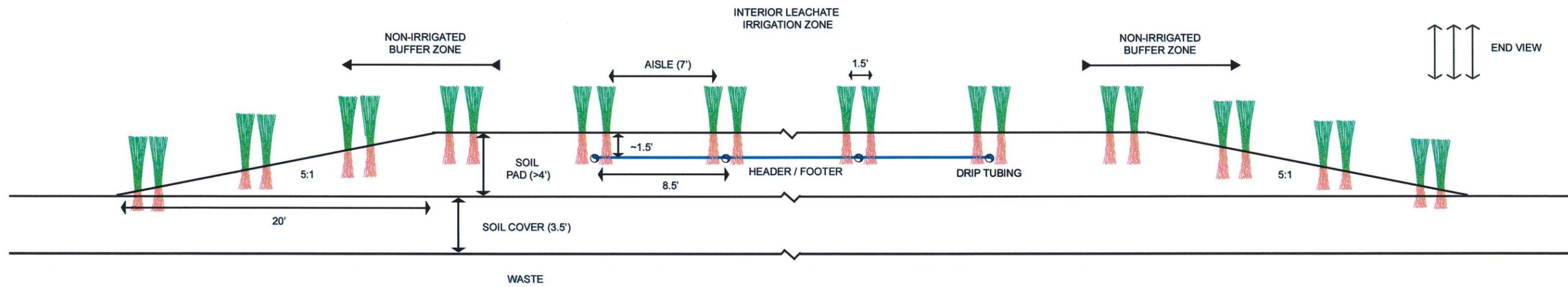


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AS-BUILT IRRIGATION LAYOUT LEACHATE PHYTO-UTILIZATION™ SYSTEM		FIGURE 2
BRAZOS VALLEY SOLID WASTE MANAGEMENT AGENCY ROCK PRAIRIE ROAD LANDFILL COLLEGE STATION, TEXAS		
FILE: RP As-Built Phyto Irrigation.pdf	DRAWN: EJW	CHECKED: RWS
		DATE: 9-14-2021



NOTES:
 1. Field separated into two zones of operation.
 2. A grass cover should be maintained on the slopes and between the vetiver rows.



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AS-BUILT PHYTO FIELD CROSS-SECTION
 LEACHATE PHYTO-UTILIZATION™ SYSTEM

BRAZOS VALLEY SOLID WASTE MANAGEMENT AGENCY
 ROCK PRAIRIE ROAD LANDFILL
 COLLEGE STATION, TEXAS

FIGURE
3

FILE: RP As-Built Phyto Cross-Section.pdf DRAWN: EJW CHECKED: RWS DATE: 9-14-2021

ATTACHMENT 2
EFFLUENT DISPOSAL BY VETIVER GRASS
IRRIGATION REPORT

**EFFLUENT DISPOSAL BY VETIVER IRRIGATION
SIMULATION FOR LANDFILL LEACHATE AT
ROCK PRAIRIE ROAD LANDFILL,
COLLEGE STATION, TEXAS**



Gulf Pines Landfill, Biloxi, MS

4 May 2019

Prepared By:



LEACHATE
MANAGEMENT SPECIALISTS
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Leachate Management Specialists
Parker, Colorado, USA



Veticon Consulting

Veticon Consulting Pty Ltd
Brisbane, Qld, Australia

INTRODUCTION

Land application of liquid waste provides a sustainable solution for on-site management and disposal of landfill leachate and wastewaters. One of these methods is called Phyto-Utilization™ and was developed by Leachate Management Specialists, LLC (LMS) in conjunction with Veticon Consulting. The general concept of a Phyto-Utilization™ system is to capitalize on the natural ability of plants to utilize the components of leachate (moisture and various compounds) as beneficial resources. The liquid in leachate is needed by the plants to satisfy water demand, and compounds in the leachate act as micro and macro nutrients to fuel plant growth. In turn, leachate is disposed (consumed by the plants) and the management of leachate is kept on-site in lieu of off-site disposal. It should be noted that this is not a flow-through treatment system followed by a discharge. Rather, the evapotranspiration (ET) capacity of the specially selected plants consumes (eliminates) leachate through the transpiration process.

Vetiver grass (*Chrysopogon zizanioides* L) is a unique plant that is especially well-suited for Phyto-Utilization™ of leachate. Fast-growing vetiver has an extremely high demand for moisture and nutrients and those characteristics are what drive the technology to be so successful. In addition, vetiver grass is non-invasive, is long lived, is very tolerant to high levels of most contaminants (organics, inorganics and nutrients), and is disease and pest resistant. Information about vetiver can be found at <http://vetiver.org>. A plant guide was published by the USDA (http://vetiver.org/USA-USDA-NRCS_Sunshine.pdf) and enough research has been conducted on vetiver such that it is clearly a non-invasive species.

In designing a leachate Phyto-Utilization™ system using vetiver, the most efficient method to match land area available for planting with the leachate generated is site-specific computer modelling. Veticon Consulting, leading international experts in vetiver systems, developed the Effluent Disposal by Vetiver Irrigation (EDVI) simulation based on established water balance methods, including the well-known Boughton (1965) water balance and the updated "Australia Water Balance Model" of Boughton (2006). Boughton's water balance models are similar to those used in Europe and North America. EDVI was designed exclusively for vetiver grass, using data from years of extensive research and development related to the effectiveness and capacity of vetiver grass in treating landfill leachate and sewage effluent in projects throughout the world.

ROCK PRAIRIE ROAD LANDFILL

LMS completed a suitability evaluation for a leachate Phyto-Utilization™ system using vetiver grass at the Rock Prairie Road Landfill (Site), located in College Station, Texas. As a result of the assessment, no fatal flaws were identified. The landfill is a closed facility with a soil cover and a leachate collection system. A total of 1.5 acres of flat area is available on top of the landfill for a vetiver planting. A perimeter of unirrigated vetiver is typically factored into the design of a Phyto-Utilization™ system, so an area approximately 1 acre is proposed for land application of leachate. It is estimated that approximately 300,000 gallons per year (GPY) of leachate is generated at the Site, but this volume could fluctuate annually and experiences seasonal variation.

To design the proper system for the Site, LMS collaborated with Veticon Consulting to complete EDVI modelling. The main objective of this simulation is to determine if the available area can be used as a phyto field with vetiver grass to consume the landfill's leachate.

EDVI MODELING & INPUT DATA

The modelling requires information on the leachate characteristics and soil properties at the Site. Numerous inputs are used in modelling, including leachate quantity and quality, soil type and depth, soil water holding capacity, local climate data, and land slope. Depending on the Site characteristics, simulation results and land area sizing are typically determined by a leading factor: liquid volume, nitrogen, or phosphorus.

When information is limited or unavailable, conservative assumptions are used. Designing a vetiver system also assumes standard recommended practices such as the following:

- Plant density of 4-6 plants/m²
- Allow for vetiver establishment with freshwater prior to commencing with leachate irrigation
- Utilize areas with low slope gradient
- Set up irrigation programming to avoid wet periods
- Cut and remove biomass to maintain a healthy field
- Routinely flush and clean irrigation tubing to avoid build-up and to promote equal application
- Regularly monitor the field through laboratory analysis of plant, soil, and leachate samples
- Inspections and lab results should be reviewed by those knowledgeable of vetiver systems

A summary of the Site's input data is shown in Table 1. Because the Site's average annual volume of leachate is estimated at 300,000 GPY, multiple volumes between 100,000 to 500,000 GPY were simulated to present a range of scenarios to satisfy plant growth.

As shown in Table 1, the leachate's average salinity is low at 6,705 umho/cm and well below the recommended limit of 15,000 umho/cm. Therefore, the salinity is not expected to affect the operation and maintenance of a Phyto-Utilization™ system.

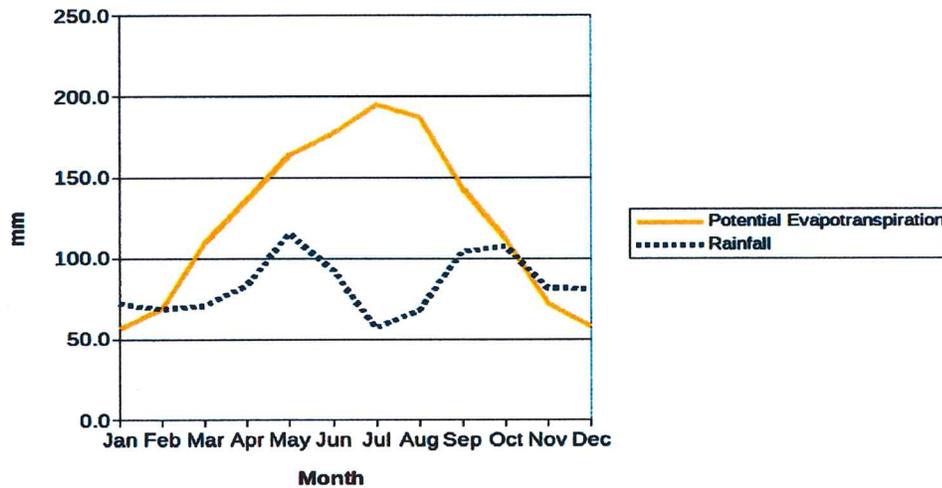
Table 1. Input Data for Rock Prairie Road Landfill

Parameter	Input
Leachate volume	100k GPY (1,100L/day) 200k GPY (2,200L/day) 300k GPY (3,300L/day) 400k GPY (4,400L/day) 500k GPY (5,500L/day)
Average Total Nitrogen	61.5 mg/L
Average Total Phosphorus	6.1 mg/L
Electroconductivity (EC)	6,705 umho/cm
Maximum Recommended EC	15,000 umho/cm
Soil Type	Loam/Clay Loam

Soil Depth	3-4 feet
Soil Fertility	Moderate levels of nutrients
Cropping Factor	1.0
Biomass (2-3 harvests/yr)	130 t/ha
Vetiver Biomass N content	1.7%
Vetiver Biomass P content	0.17%

In addition to the above inputs, average of long-term rainfall data for 66 years and potential ET data for 40 years were used in the EDVI modelling. The rain and ET trends for the area are illustrated in Figure 1. Rain data is from the US National Oceanic and Atmospheric Administration, National Centers for Environmental Information, Custom Monthly Summary for College Station Easterwood Field, Texas. Potential ET data is from the US Geological Survey Hydro-Climatic Data Network at East Yegua Creek Near Dime Box, Texas.

Figure 1. Rainfall and Potential Evapotranspiration in College Station, Texas



SIMULATION DESIGN

This EDVI modelling is designed on the conservative concept that the leachate applied to the phyto field is offset by the increased ET provided by the vetiver plants, resulting in no additional net infiltration on an annual basis. Due to weather variations, there are periods that input exceeds ET such as January - February, and November - December shown in Fig 1. During this period, leachate can be retained in the soil profile and used up from March to October, particularly in July and August when ET far exceeds rainfall.

SIMULATION RESULTS

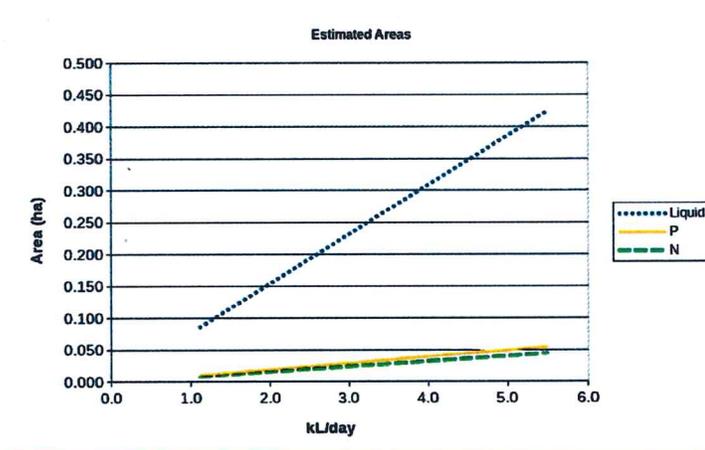
EDVI modelling results are presented in Table 2 to illustrate five leachate volume scenarios and the land area that can be planted to sustain healthy vetiver growth. Based on the results, the liquid volume of the leachate is the determining factor for sizing instead of nutrient loading for this Site, as illustrated by Figure 2. In this simulation, leachate listed for each scenario can be consumed through ET using vetiver grass.

Table 2 shows that a 0.60-acre area of vetiver can completely consume 300,000 GPY of leachate, while an area of 1.1 acres can handle a volume of at least 500,000 GPY.

Table 2. EDVI Simulation Scenario Results

Input Volumes	Land Area (ha)		
	Liquid Volume	Phosphorus	Nitrogen
100k GPY (1,100L/day)	0.08 (0.21 ac)	0.01 (0.02 ac)	0.01 (0.02 ac)
200k GPY (2,200L/day)	0.17 (0.42 ac)	0.02 (0.05 ac)	0.02 (0.05 ac)
300k GPY (3,300L/day)	0.24 (0.60 ac)	0.03 (0.07 ac)	0.03 (0.07 ac)
400k GPY (4,400L/day)	0.34 (0.85 ac)	0.04 (0.10 ac)	0.04 (0.10 ac)
500k GPY (5,500L/day)	0.42 (1.1 ac)	0.06 (0.15 ac)	0.05 (0.12 ac)

Figure 2. Land Areas Needed for Total Consumption of Leachate Ranging from 1KL/day to 5.5KL/day (equivalent to 100,000 to 500,000 GPY) at Total N Level of 61.5mg/L and P of 6.1mg/L



In addition to developing simulation scenarios, it is important to list anticipated monthly consumption of leachate by a Phyto-Utilization™ system based on available Site characteristics such as rain, evapotranspiration, and leachate generation. This information will help with the design of the system and its flow set points on a monthly basis. Table 3 below lists the anticipated monthly consumption rate of leachate for a 1-acre system when a leachate flow of 25,000 gallons per month (300,000 GPY) is uniformly applied throughout the year and the monthly potential maximum consumption rate per acre.

Table 3: Anticipated and Potential Monthly Consumption of Leachate

Month	Anticipated monthly consumption rate of leachate per acre when uniformly applied throughout the year at 25,000 gallons per month	Potential monthly maximum consumption rate per acre
Jan	0	0
Feb	0	1,000
Mar	26,000	41,000
Apr	56,000	56,000
May	51,000	51,000
June	86,000	90,000
July	25,000	147,000
Aug	25,000	127,000
Sept	25,000	41,000
Oct	5,000	5,000
Nov	0	0
Dec	0	0
Total	300,000	560,000

The anticipated monthly consumption rate indicates that no significant consumption will occur during January, February, November and December, so leachate can be accumulated in the soil during those months of irrigation utilizing field holding capacity, and then consumed during the rest of the year. The potential *maximum* consumption rate indicates that a 1-acre area can consume up to 560,000 GPY of leachate. Actual consumption will vary by year based on actual conditions.

CONCLUSIONS

Results of the EDVI modelling indicate that 300,000 GPY can be consumed by the Phyto-Utilization™ system using vetiver in a 0.60-acre area. Results of the EDVI modelling also indicate that 500,000 GPY of leachate can be consumed by a 1-acre vetiver phyto area.

A Phyto-Utilization™ system should be sized larger than needed to be conservative and to provide excess capacity in case additional leachate generation occurs. This oversizing also anticipates yearly and seasonal fluctuations in precipitation and leachate quality. Additionally, the increased ET capacity of a Phyto-Utilization™ system using vetiver should result in a reduction of the precipitation currently infiltrating into the landfill and result in better overall conditions for the Site, especially if a volume less than the full ET capacity is distributed over the 1-acre plot.

It is recommended to regularly monitor plant health and system operations. Annual sampling of soil, leachate, and foliar will also help determine if supplemental nutrients and fertilizers are necessary to maintain the phyto field.

Land application of leachate and wastewater using vetiver systems like Phyto-Utilization™ provide numerous benefits for a facility, including disposal of leachate through a GREEN and sustainable way, reduced costs and financial liability, reduced carbon footprint, improved wildlife habitat and aesthetics, and the potential for a year-round, zero-discharge leachate management solution.

ATTACHMENT 2
REPLACEMENT PAGES (CLEAN)

**ROCK PRAIRIE ROAD LANDFILL
BRAZOS COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1444C**

PERMIT MODIFICATION

**PART III
ATTACHMENT 12
FINAL CLOSURE PLAN**

Prepared for

Brazos Valley Solid Waste Management Agency, Inc.

October 2001

Revised September 2021



Prepared by

Weaver Consultants Group, LLC
TBPE Registration No F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 3086-352-11-03

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7.0 ESTIMATED COSTS

Table 12-1 summarizes the estimated costs for final closure of the largest area requiring final cover. The estimated costs will be updated annually or as required to reflect any increased costs in construction or materials. A copy of the revised closure costs will be submitted to the Executive Director of the TCEQ. Table 12-2 summarizes the estimated costs for final closure of the phyto-utilization area.

**Table 12-1
Closure Costs**

Description	Quantity	Unit	Unit Costs	Total Costs
Engineering				
Topographic Survey	1	LS	\$5,000	\$5,000
Boundary Survey	50	HR	\$80	\$4,000
Site Evaluation	1	LS	\$15,000	\$15,000
Development of Closure Plan	1	LS	\$15,000	\$15,000
Contract Administration	1	LS	\$5,000	\$5,000
Administrative Costs	1	LS	\$5,000	\$5,000
Closure Inspection	370	HR	\$80	\$29,600
Testing		LS		\$30,000
Permit Compliance Package	1	LS	\$5,000	\$5,000
Engineering Total				\$83,600
Construction				
Pre-Subtitle D 31 Acre Area				
Soil Cover	28,257	CY	\$3.25	\$85,335
Clay Cap	78,771	CY	\$5.25	\$413,548
Re-vegetation	31	Acres	\$1,000	\$31,000
Site Grading and Drainage	31	Acres	\$500	\$15,500
Subtitle D 53 Acre Area				
Soil Cover	179,564	CY	\$3.25	\$583,583
Clay Cap	134,673	CY	\$5.25	\$707,033
Synthetic Membrane	2,424,114	SF	\$0.50	\$1,212,057
Drainage Layer	2,424,114	SF	\$0.42	\$1,018,128
Re-vegetation	53.0	Acres	\$1,000	\$53,000
Site Grading and Drainage	53.0	Acres	\$500	\$26,500
Construction Total				\$4,145,684
Subtotal				\$4,229,284
Contingency 15%				\$634,393
Closure Total				\$4,898,177

**TABLE 12-2
ROCK PRAIRIE ROAD LANDFILL - PHYTO-UTILIZATION AREA CLOSURE COST**

Area Requiring Final Cover		1.5	ac	Infiltration Layer Thickness		1.5	ft (Composite Final Cover)	Erosion Layer Thickness		1.0	ft	
Description	Quantity	Unit ¹	Unit ² Cost	Total Cost	Comments							
1.0 ENGINEERING												
1.1 Development of Plans	1.0	LS	\$ 5,000	\$ 5,000	Includes third party preparation of final cover design and construction plans including specifications (includes grading, drainage, and revegetation).							
1.2 Closure Inspection and Testing	1.0	LS	\$ 7,500	\$ 7,500	Includes third party inspection during closure construction, thickness and permeability verifications, survey, and preparation of closure report.							
ENGINEERING TOTAL				\$ 12,500								
2.0 CONSTRUCTION												
2.1 Testing of Phyto Utilization System Area Soil	1	LS	\$ 8,500	\$ 8,500	Includes sampling, shipping, laboratory analysis and technical review of results of samples collected at six locations of 100-foot by 100-foot grid across the phyto utilization system area. Four samples collected at each sample location (2 in phyto utilization pad, and 2 in underlying erosion layer and infiltration layer).							
2.2 Removal of Contaminated Soil (If Required)	13,310	CY	\$ 15.00	\$ 199,650	Includes excavation and hauling of soil to Twin Oaks Landfill for disposal.							
2.3 Final Cover System	3,025	CY	\$ 5.00	\$ 15,125	Includes excavation, hauling, and construction of a 1.5-foot thick clay material infiltration layer over the phyto utilization system area.							
2.3.1 Infiltration Layer	2,017	CY	\$ 2.50	\$ 5,042	Includes excavation, hauling, and construction of a 1-foot thick earthen material erosion layer over entire closure area.							
2.3.2 Erosion Layer	1.5	AC	\$ 2,000	\$ 3,000	Includes vegetation of completed cover and general fill via seeding and application of fertilizer over the area requiring final cover.							
2.4 Revegetation	1	LS	\$ 2,000	\$ 2,000	Includes the cost for removal and disposal of the two leachate storage tanks associated with the phyto utilization system.							
2.5 Removal of Onsite Storage Tanks				\$ 233,317								
CONSTRUCTION TOTAL				\$ 245,817								
ENGINEERING & CONSTRUCTION SUBTOTAL				\$ 284,086								
3.0 CONTINGENCY		10%		\$ 24,582								
4.0 CONTRACT PERFORMANCE BOND		1.5%		\$ 3,687								
5.0 LEGAL FEES		LS		\$ 5,000								
6.0 TCEQ ADMINISTRATION OF CONTRACTS		LS		\$ 5,000								
TOTAL CLOSURE COST				\$ 284,086								

¹LS = Lump Sum, AC = acres, CY = cubic yards.

²Unit Costs are in 2021 dollars. Unit costs are based on current market conditions, typical engineering costs, and industry standards related to construction and reflect input from BVSWMA, Inc. and Weaver Consultants Group, LLC.



**ROCK PRAIRIE ROAD LANDFILL
BRAZOS COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1444C**

PERMIT MODIFICATION

**PART III
ATTACHMENT 15
LEACHATE AND CONTAMINATED WATER PLAN**

Prepared for

Brazos Valley Solid Waste Management Agency, Inc.

Revised September 2021

Prepared by

Weaver Consultants Group, LLC
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817-735-9770



WCG Project No. 3086-352-11-03

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4.5.1 Conveyance by Tanker Truck

Leachate may be withdrawn from the collection sumps and placed into tanker trucks. Spill containment for truck hose connection and loading will be provided by a portable trough or similar spill containment. Protection will be provided at hose connection locations. Leachate will be transported to an authorized and permitted facility for treatment and disposal.

4.6 LEACHATE STORAGE

Leachate storage is not proposed for the site at this time. Temporary storage may be provided in the future.

4.7 LEACHATE TREATMENTS AND DISPOSAL

Tanker trucks will collect the leachate that has accumulated in the sumps and transport it to a permitted WWTP. All leachate transferred to the WWTP will be handled in compliance with TCEQ requirements. Additionally, a phyto-utilization system may be implemented for the onsite use of leachate by vetiver grass (refer to Appendix 5 for additional information).

Leachate may also be recirculated at the landfill. This process involves taking leachate from the sumps, and pumping it back into the waste. Recirculation will only take place on areas of the landfill that have Subtitle D liner systems.

**ROCK PRAIRIE ROAD LANDFILL
BRAZOS COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1444C**

PERMIT MODIFICATION

**PART III
ATTACHMENT 15
APPENDIX 5
PHYTO-UTILIZATION SYSTEM INFORMATION**

Prepared for

Brazos Valley Solid Waste Management Agency, Inc.

September 2021



Prepared by

Weaver Consultants Group, LLC
TBPE Registration No F-3727
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Fort Worth, Texas 76109
817-735-9770

WCG Project No. 3086-352-11-03

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ATTACHMENT 2

Effluent Disposal by Vetiver Irrigation Report



1 INTRODUCTION

The Rock Prairie Road Landfill (TCEQ Permit No. MSW-1444C) is an existing Type I Municipal Solid Waste Landfill located in Brazos County. The permitted limit of waste for the facility is approximately 98 acres of which approximately 55 acres contain a Subtitle D compliant liner system and leachate collection system (the remaining 43 acres consists of a pre-Subtitle D liner system). The entire 98-acre waste footprint is currently covered by a permitted final cover system consisting of an 18-inch compacted clay infiltration layer and a 12-inch erosion layer.

A temporary authorization was approved in November 2019 which allowed for the construction and operation of the phyto-utilization system on a temporary basis. The phyto-utilization system is located over a portion of the Subtitle D lined portion of the waste footprint. Specifically, the phyto-utilization system includes a subsurface drip irrigation system combined with strategic plantings of vetiver grass to “dispose” of leachate generated onsite and use the leachate as a beneficial resource to help plants grow. The only leachate to be treated will be leachate generated at the Rock Prairie Road Landfill.

Vetiver grass is a non-invasive plant that has a high demand for moisture and nutrients (both provided by leachate). Vetiver grass has proven to be successful in the management of leachate in other facilities in Texas. By utilizing the ability of the vetiver grass to consume the leachate distributed through the drip irrigation system the facility can capitalize on the natural ability of the grass to utilize both the moisture and nutrients from the leachate.

Prior to development and approval of the temporary authorization, BVSWMA contracted with Leachate Management Specialists (LMS) to review the site conditions to determine if phyto-utilization would be an advantageous option for the Rock Prairie Road Landfill. LMS reviewed various site information including existing climate data, onsite soil quality, and site specific leachate chemistry and concluded that phyto-utilization would be a suitable option for leachate disposal. As part of this review, LMS (in coordination with Veticon Consulting) prepared an effluent disposal by vetiver irrigation (EDVI) evapotranspiration model to determine the area needed to consume the site’s average annual leachate volume. A summary of LMS’s findings and the EDVI model is included in Attachment 2. This model concluded that approximately 0.6 acres would be needed to consume the site’s average annual leachate volume. To provide for a conservative approach, LMS recommended that a 1-acre phyto-utilization system be installed.

2 PROPOSED PHYTO-UTILIZATION SYSTEM

2.1 Description of Phyto-Utilization System Area

As discussed in Section 1, the waste footprint at the Rock Prairie Road Landfill is currently covered with a final cover system consisting of an 18-inch compacted clay layer and a 12-inch erosion layer. A current site plan of the facility is shown on Figure 1 (Attachment 1). The phyto-utilization system area was constructed by installing an additional 4 feet of soil on the portion of the existing top deck of the landfill (over a Subtitle D compliant liner system). This area was transitioned back to existing grade at a maximum 5H:1V slope.

2.2 Phyto-Utilization System Design

The phyto-utilization system consists of two dual contained leachate storage tanks, a control shed, a drip irrigation system, a series of vetiver grass plantings around the drip irrigation system, and a series of vetiver grass plantings around the perimeter of the drip irrigation system. The layout of the phyto-utilization system is included on Figure 1A.

Leachate from the site is currently directed from the existing leachate collection sumps to existing leachate injection wells located on the Subtitle D portions of the landfill through a series of pumps. With this phyto-utilization system, leachate is pumped from the existing leachate collection sump via forcemain to a dual contained leachate storage tank (maximum 2,000-gallon capacity) located at the eastern portion of the site. Leachate is then pumped via forcemain to the dual contained leachate storage tank (maximum 6,000-gallon capacity) located adjacent to the phyto-utilization system area.

The system consists of the dual-contained leachate storage tanks and enclosed pre-treatment and distribution system, supply piping, drip irrigation tubing, and vetiver grass. A drip irrigation system was installed approximately 18 inches below grade in the soil pad. Vetiver grass was planted in evenly spaced double rows along the drip tubing, as well as around the perimeter of the irrigated area to serve as a buffer. The rest of the pad was seeded with cover grass to further enhance evapotranspiration. The layout and details for the irrigation system and vetiver grass plantings is shown on Figures 2 and 3.

The control shed includes the control system that initiates the distribution of the leachate to the phyto-utilization area. This control system is equipped with a weather sensor to ensure that the phyto-utilization system will not operate during rainfall events. Excess leachate not transferred to the phyto-utilization area is directed to the existing leachate injection wells.

2.3 Phyto-Utilization System Maintenance

Maintenance will be conducted throughout the use of the phyto-utilization system. The control system will include a notification system that will notify personnel of any alarms or automatic shutdown of the distribution system. In addition, regular inspections and maintenance of the control and distribution system will occur. Equipment repairs, replanting, and mowing will occur as necessary based on actual site conditions.

2.4 Phyto-Utilization System Monitoring

The behavior of metals in soils is affected by a multitude of highly complex geochemical processes influenced by soil composition, structure, saturation, temperature, degree of heterogeneity, etc. The continuous interaction of these processes can make it difficult to establish an accurate background concentration limit without collecting and testing an abundance of statistically independent background samples intermittently over an extended period of time. This is due to the variability of natural geochemical processes including stratification and seasonality among others.

For these reasons, a two-tiered compliance monitoring protocol is proposed that includes comparison of analytical results to a risk-based action level concentration coupled with verification resampling. An action level equal to 50 percent of the Tier 1 Residential Soil PCLs is proposed as an upper limit to the total metals concentrations detected in individual soil samples collected as part of routine pad soil compliance monitoring. This action-level facilitates the use of established human health exposure risk-based standards for soil data comparison. Using 50 percent of the PCL concentration establishes a conservative risk-based threshold for evaluating total metals concentrations in the pad soils. In the event that a metal concentration exceeds 50 percent the PCL, the facility will conduct resampling within 90 days to either verify or disconfirm the initial apparent exceedance. This verification resampling strategy is similar to the 1 of 2 testing strategy used in many aqueous sampling statistical protocols and is designed with the purpose of reducing false positives in analytical testing results. If an exceedance is verified by the resampling results, the facility will notify TCEQ in writing and provide a proposed course of action in response to the exceedance. It is noted that because the threshold for an exceedance equates to 50 percent the PCL concentration, identification of an exceedance does not necessarily have any direct regulatory implications. However, the facility may cease leachate application while consulting with TCEQ to establish a proposed course of action.

Volatile organic compounds (VOCs) are not commonly naturally occurring in surface soils. TPH and BTEX constituents have not been detected at or above the method detection limit (MDL) in any of the collected soil samples to-date. Therefore, the MDL is proposed as a highly conservative action level for TPH and BTEX. This strategy is similar to the double quantification rule (DQR) used in many aqueous sampling statistical protocols.

In the event that TPH or BTEX constituents are detected at or above the MDL, the facility will firstly conduct resampling within 90 days to verify or disconfirm the initial apparent exceedance. If an exceedance is confirmed by the resampling results, the facility will notify TCEQ in writing and provide a proposed course of action in response to the exceedance in the same manner as described for a metals exceedance.

Soil sampling will be conducted on a semiannual frequency. The following summarized the soil sampling and evaluation procedures:

- A 100-foot by 100-foot sampling grid will be established across the phyto-utilization area.
- Soil samples will be obtained within each grid area and collected from a depth of 3-feet below surface grade which equates to 1 foot above the bottom of the phyto-utilization soil pad fill.
- Soil samples will be analyzed for the eight RCRA total metals, Total Petroleum Hydrocarbons (TPH), and BTEX constituents (benzene, toluene, ethylbenzene, and xylenes) by a NELAC-certified environmental testing laboratory accredited in the state of Texas.
- The testing results will be filed in the facility's Site Operating Record within 90 days of sampling.
- Any TPH or BTEX constituent that is detected at or above the MDL will be considered an exceedance.
- The total metal analytical results will be compared to the action levels listed in Table 1 which equate to 50% the Tier 1 residential soil PCLs.
- If an action level is exceeded by an individual soil sample's analytical concentration, verification resampling will be conducted. The facility will resample the location within 90 days of the soil sampling date for the analytical concentration exhibiting the unverified exceedance.
- If the resampling results do not verify the initial apparent action level exceedance, the facility will document the results in the SOR and no further action will be required.
- If the initial exceedance is verified by the resampling results, the facility will notify TCEQ in writing within 14 days of the exceedance verification. The notification submittal will include a copy of the laboratory analytical testing reports and a recommendation for a proposed course of action.

Table 1
Action Levels for Total Metals

Constituent	Arsenic (mg/kg)	Barium (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Lead (mg/kg)	Mercury (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)
Tier 1 Residential Soil PCL	24	8,100	52	33,000	500	3.6	310	97
Action Level (50% the PCL)	12	4,050	26	16,500	250	1.8	155	48.5

3 DECOMMISSIONING OF PHYTO-UTILIZATION SYSTEM

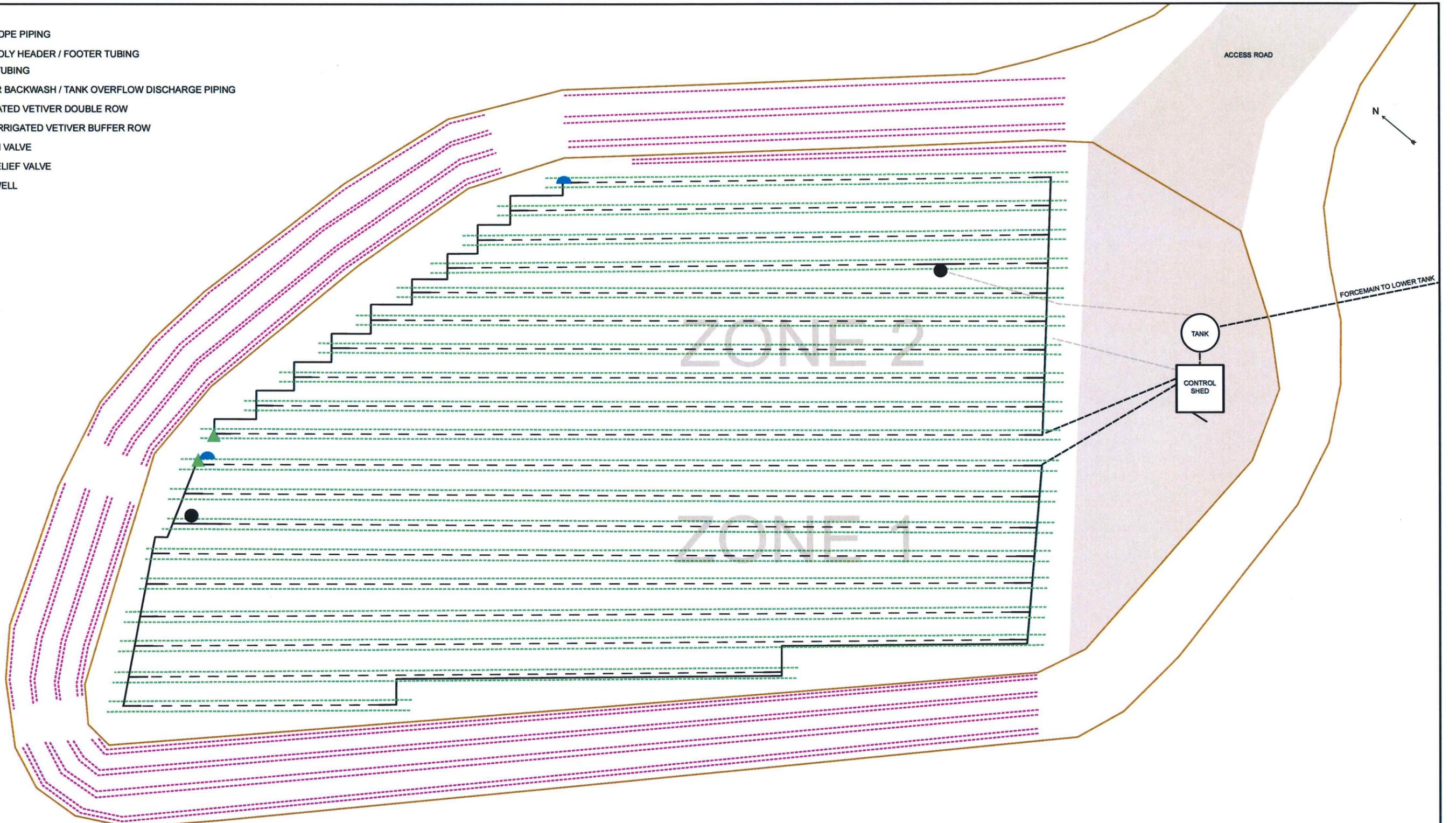
Prior to excavating and/or disposing of phyto-utilization soils and plantings, laboratory testing will be performed of the soils to determine their suitability for use as clean soil fill or for off-site disposal into a permitted landfill. Soil sampling and testing procedures will be conducted in the same manner as the semiannual compliance monitoring discussed in Section 2.4.

Any required removal of the final cover system will be repaired consistent with the permitted Final Cover Quality Control Plan. Soils (and vegetative cover) found to be below action level concentrations will be either left in place or regraded (if necessary) to ensure positive drainage is maintained. Refer to Attachment 12 for the phyto-utilization system closure cost.

ATTACHMENT 1

FIGURES

- 2" Ø HDPE PIPING
- 1" Ø POLY HEADER / FOOTER TUBING
- - - - - DRIP TUBING
- - - - - FILTER BACKWASH / TANK OVERFLOW DISCHARGE PIPING
- IRRIGATED VETIVER DOUBLE ROW
- NON-IRRIGATED VETIVER BUFFER ROW
- ▲ FLUSH VALVE
- AIR RELIEF VALVE
- GAS WELL



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AS-BUILT IRRIGATION LAYOUT
 LEACHATE PHYTO-UTILIZATION™ SYSTEM

BRAZOS VALLEY SOLID WASTE MANAGEMENT AGENCY
 ROCK PRAIRIE ROAD LANDFILL
 COLLEGE STATION, TEXAS

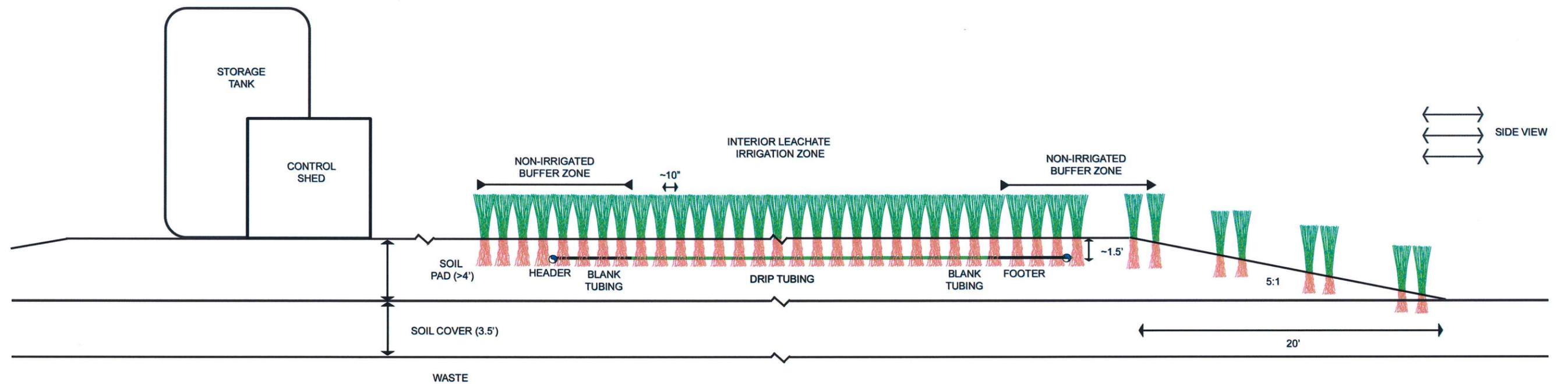
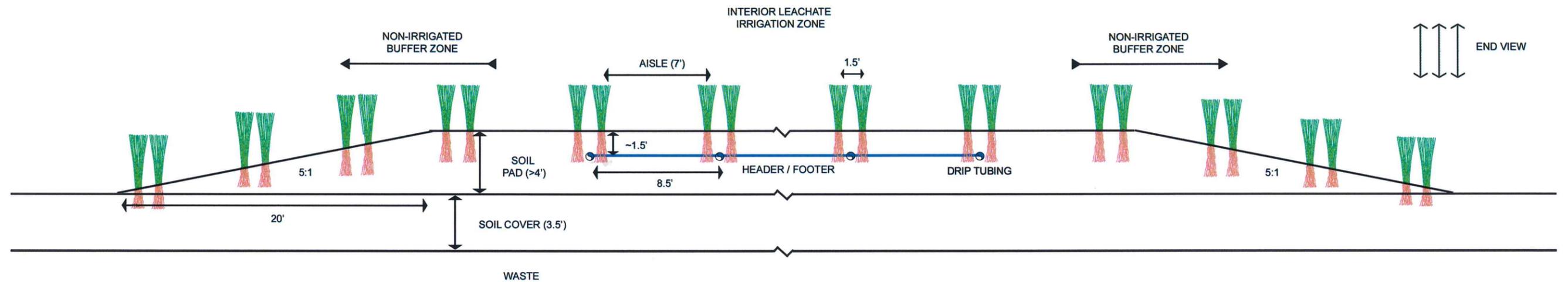
FIGURE
2

FILE: RP As-Built Phyto Irrigation.pdf

DRAWN: EJW

CHECKED: RWS

DATE: 9-14-2021



NOTES:

1. Field separated into two zones of operation.
2. A grass cover should be maintained on the slopes and between the vetiver rows.



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AS-BUILT PHYTO FIELD CROSS-SECTION
 LEACHATE PHYTO-UTILIZATION™ SYSTEM

BRAZOS VALLEY SOLID WASTE MANAGEMENT AGENCY
 ROCK PRAIRIE ROAD LANDFILL
 COLLEGE STATION, TEXAS

FIGURE

3

FILE: RP As-Built Phyto Cross-Section.pdf

DRAWN: EJW

CHECKED: RWS

DATE: 9-14-2021

ATTACHMENT 2

**EFFLUENT DISPOSAL BY VETIVER GRASS
IRRIGATION REPORT**

**EFFLUENT DISPOSAL BY VETIVER IRRIGATION
SIMULATION FOR LANDFILL LEACHATE AT
ROCK PRAIRIE ROAD LANDFILL,
COLLEGE STATION, TEXAS**



Gulf Pines Landfill, Biloxi, MS

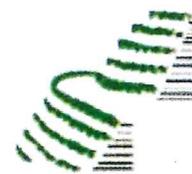
4 May 2019

Prepared By:



LEACHATE
MANAGEMENT SPECIALISTS
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**Leachate Management Specialists
Parker, Colorado, USA**



Veticon Consulting

**Veticon Consulting Pty Ltd
Brisbane, Qld, Australia**

INTRODUCTION

Land application of liquid waste provides a sustainable solution for on-site management and disposal of landfill leachate and wastewaters. One of these methods is called Phyto-Utilization™ and was developed by Leachate Management Specialists, LLC (LMS) in conjunction with Veticon Consulting. The general concept of a Phyto-Utilization™ system is to capitalize on the natural ability of plants to utilize the components of leachate (moisture and various compounds) as beneficial resources. The liquid in leachate is needed by the plants to satisfy water demand, and compounds in the leachate act as micro and macro nutrients to fuel plant growth. In turn, leachate is disposed (consumed by the plants) and the management of leachate is kept on-site in lieu of off-site disposal. It should be noted that this is not a flow-through treatment system followed by a discharge. Rather, the evapotranspiration (ET) capacity of the specially selected plants consumes (eliminates) leachate through the transpiration process.

Vetiver grass (*Chrysopogon zizanioides* L) is a unique plant that is especially well-suited for Phyto-Utilization™ of leachate. Fast-growing vetiver has an extremely high demand for moisture and nutrients and those characteristics are what drive the technology to be so successful. In addition, vetiver grass is non-invasive, is long lived, is very tolerant to high levels of most contaminants (organics, inorganics and nutrients), and is disease and pest resistant. Information about vetiver can be found at <http://vetiver.org>. A plant guide was published by the USDA (http://vetiver.org/USA-USDA-NRCS_Sunshine.pdf) and enough research has been conducted on vetiver such that it is clearly a non-invasive species.

In designing a leachate Phyto-Utilization™ system using vetiver, the most efficient method to match land area available for planting with the leachate generated is site-specific computer modelling. Veticon Consulting, leading international experts in vetiver systems, developed the Effluent Disposal by Vetiver Irrigation (EDVI) simulation based on established water balance methods, including the well-known Boughton (1965) water balance and the updated "Australia Water Balance Model" of Boughton (2006). Boughton's water balance models are similar to those used in Europe and North America. EDVI was designed exclusively for vetiver grass, using data from years of extensive research and development related to the effectiveness and capacity of vetiver grass in treating landfill leachate and sewage effluent in projects throughout the world.

ROCK PRAIRIE ROAD LANDFILL

LMS completed a suitability evaluation for a leachate Phyto-Utilization™ system using vetiver grass at the Rock Prairie Road Landfill (Site), located in College Station, Texas. As a result of the assessment, no fatal flaws were identified. The landfill is a closed facility with a soil cover and a leachate collection system. A total of 1.5 acres of flat area is available on top of the landfill for a vetiver planting. A perimeter of unirrigated vetiver is typically factored into the design of a Phyto-Utilization™ system, so an area approximately 1 acre is proposed for land application of leachate. It is estimated that approximately 300,000 gallons per year (GPY) of leachate is generated at the Site, but this volume could fluctuate annually and experiences seasonal variation.

To design the proper system for the Site, LMS collaborated with Veticon Consulting to complete EDVI modelling. The main objective of this simulation is to determine if the available area can be used as a phyto field with vetiver grass to consume the landfill's leachate.

EDVI MODELING & INPUT DATA

The modelling requires information on the leachate characteristics and soil properties at the Site. Numerous inputs are used in modelling, including leachate quantity and quality, soil type and depth, soil water holding capacity, local climate data, and land slope. Depending on the Site characteristics, simulation results and land area sizing are typically determined by a leading factor: liquid volume, nitrogen, or phosphorus.

When information is limited or unavailable, conservative assumptions are used. Designing a vetiver system also assumes standard recommended practices such as the following:

- Plant density of 4-6 plants/m²
- Allow for vetiver establishment with freshwater prior to commencing with leachate irrigation
- Utilize areas with low slope gradient
- Set up irrigation programming to avoid wet periods
- Cut and remove biomass to maintain a healthy field
- Routinely flush and clean irrigation tubing to avoid build-up and to promote equal application
- Regularly monitor the field through laboratory analysis of plant, soil, and leachate samples
- Inspections and lab results should be reviewed by those knowledgeable of vetiver systems

A summary of the Site's input data is shown in Table 1. Because the Site's average annual volume of leachate is estimated at 300,000 GPY, multiple volumes between 100,000 to 500,000 GPY were simulated to present a range of scenarios to satisfy plant growth.

As shown in Table 1, the leachate's average salinity is low at 6,705 umho/cm and well below the recommended limit of 15,000 umho/cm. Therefore, the salinity is not expected to affect the operation and maintenance of a Phyto-Utilization™ system.

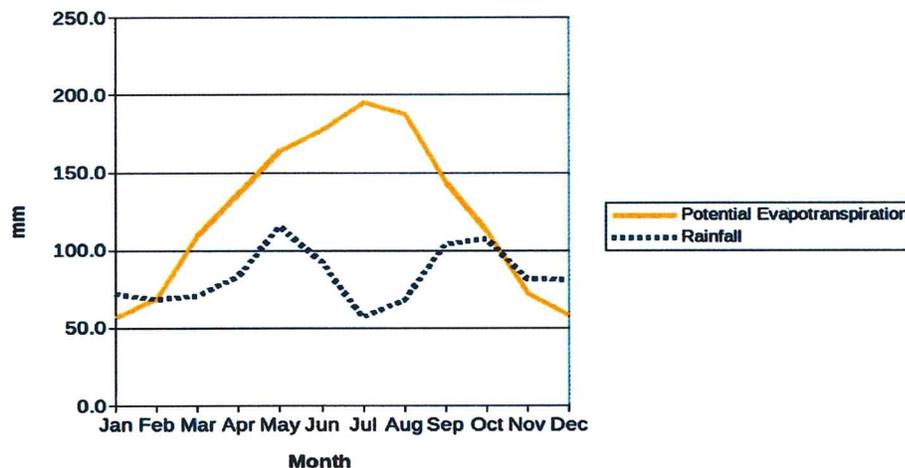
Table 1. Input Data for Rock Prairie Road Landfill

Parameter	Input
Leachate volume	100k GPY (1,100L/day) 200k GPY (2,200L/day) 300k GPY (3,300L/day) 400k GPY (4,400L/day) 500k GPY (5,500L/day)
Average Total Nitrogen	61.5 mg/L
Average Total Phosphorus	6.1 mg/L
Electroconductivity (EC)	6,705 umho/cm
Maximum Recommended EC	15,000 umho/cm
Soil Type	Loam/Clay Loam

Soil Depth	3-4 feet
Soil Fertility	Moderate levels of nutrients
Cropping Factor	1.0
Biomass (2-3 harvests/yr)	130 t/ha
Vetiver Biomass N content	1.7%
Vetiver Biomass P content	0.17%

In addition to the above inputs, average of long-term rainfall data for 66 years and potential ET data for 40 years were used in the EDVI modelling. The rain and ET trends for the area are illustrated in Figure 1. Rain data is from the US National Oceanic and Atmospheric Administration, National Centers for Environmental Information, Custom Monthly Summary for College Station Easterwood Field, Texas. Potential ET data is from the US Geological Survey Hydro-Climatic Data Network at East Yegua Creek Near Dime Box, Texas.

Figure 1. Rainfall and Potential Evapotranspiration in College Station, Texas



SIMULATION DESIGN

This EDVI modelling is designed on the conservative concept that the leachate applied to the phyto field is offset by the increased ET provided by the vetiver plants, resulting in no additional net infiltration on an annual basis. Due to weather variations, there are periods that input exceeds ET such as January - February, and November - December shown in Fig 1. During this period, leachate can be retained in the soil profile and used up from March to October, particularly in July and August when ET far exceeds rainfall.

SIMULATION RESULTS

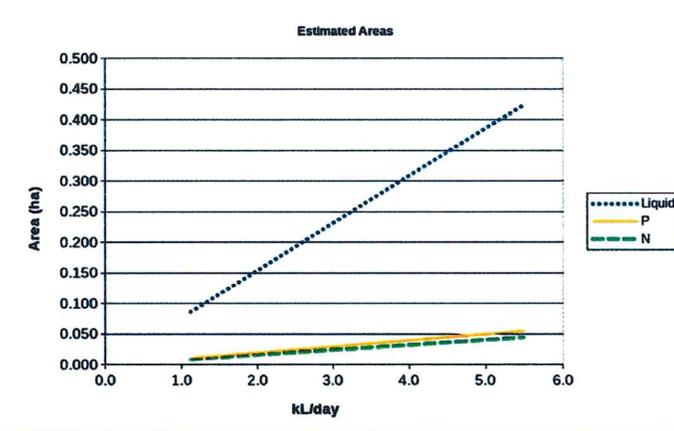
EDVI modelling results are presented in Table 2 to illustrate five leachate volume scenarios and the land area that can be planted to sustain healthy vetiver growth. Based on the results, the liquid volume of the leachate is the determining factor for sizing instead of nutrient loading for this Site, as illustrated by Figure 2. In this simulation, leachate listed for each scenario can be consumed through ET using vetiver grass.

Table 2 shows that a 0.60-acre area of vetiver can completely consume 300,000 GPY of leachate, while an area of 1.1 acres can handle a volume of at least 500,000 GPY.

Table 2. EDVI Simulation Scenario Results

Input Volumes	Land Area (ha)		
	Liquid Volume	Phosphorus	Nitrogen
100k GPY (1,100L/day)	0.08 (0.21 ac)	0.01 (0.02 ac)	0.01 (0.02 ac)
200k GPY (2,200L/day)	0.17 (0.42 ac)	0.02 (0.05 ac)	0.02 (0.05 ac)
300k GPY (3,300L/day)	0.24 (0.60 ac)	0.03 (0.07 ac)	0.03 (0.07 ac)
400k GPY (4,400L/day)	0.34 (0.85 ac)	0.04 (0.10 ac)	0.04 (0.10 ac)
500k GPY (5,500L/day)	0.42 (1.1 ac)	0.06 (0.15 ac)	0.05 (0.12 ac)

Figure 2. Land Areas Needed for Total Consumption of Leachate Ranging from 1KL/day to 5.5KL/day (equivalent to 100,000 to 500,000 GPY) at Total N Level of 61.5mg/L and P of 6.1mg/L



In addition to developing simulation scenarios, it is important to list anticipated monthly consumption of leachate by a Phyto-Utilization™ system based on available Site characteristics such as rain, evapotranspiration, and leachate generation. This information will help with the design of the system and its flow set points on a monthly basis. Table 3 below lists the anticipated monthly consumption rate of leachate for a 1-acre system when a leachate flow of 25,000 gallons per month (300,000 GPY) is uniformly applied throughout the year and the monthly potential maximum consumption rate per acre.

Table 3: Anticipated and Potential Monthly Consumption of Leachate

Month	Anticipated monthly consumption rate of leachate per acre when uniformly applied throughout the year at 25,000 gallons per month	Potential monthly maximum consumption rate per acre
Jan	0	0
Feb	0	1,000
Mar	26,000	41,000
Apr	56,000	56,000
May	51,000	51,000
June	86,000	90,000
July	25,000	147,000
Aug	25,000	127,000
Sept	25,000	41,000
Oct	5,000	5,000
Nov	0	0
Dec	0	0
Total	300,000	560,000

The anticipated monthly consumption rate indicates that no significant consumption will occur during January, February, November and December, so leachate can be accumulated in the soil during those months of irrigation utilizing field holding capacity, and then consumed during the rest of the year. The potential *maximum* consumption rate indicates that a 1-acre area can consume up to 560,000 GPY of leachate. Actual consumption will vary by year based on actual conditions.

CONCLUSIONS

Results of the EDVI modelling indicate that 300,000 GPY can be consumed by the Phyto-Utilization™ system using vetiver in a 0.60-acre area. Results of the EDVI modelling also indicate that 500,000 GPY of leachate can be consumed by a 1-acre vetiver phyto area.

A Phyto-Utilization™ system should be sized larger than needed to be conservative and to provide excess capacity in case additional leachate generation occurs. This oversizing also anticipates yearly and seasonal fluctuations in precipitation and leachate quality. Additionally, the increased ET capacity of a Phyto-Utilization™ system using vetiver should result in a reduction of the precipitation currently infiltrating into the landfill and result in better overall conditions for the Site, especially if a volume less than the full ET capacity is distributed over the 1-acre plot.

It is recommended to regularly monitor plant health and system operations. Annual sampling of soil, leachate, and foliar will also help determine if supplemental nutrients and fertilizers are necessary to maintain the phyto field.

Land application of leachate and wastewater using vetiver systems like Phyto-Utilization™ provide numerous benefits for a facility, including disposal of leachate through a GREEN and sustainable way, reduced costs and financial liability, reduced carbon footprint, improved wildlife habitat and aesthetics, and the potential for a year-round, zero-discharge leachate management solution.

APPENDIX B
TCEQ-20650 FORM

Facility Name: Rock Prairie Road Landfill
Permittee/Registrant Name: Brazos Valley Solid Waste Management Agency, Inc.
MSW Authorization #: 1444C
Initial Submittal Date: 09/01/2021
Revision Date:



Texas Commission on Environmental Quality

Permit/Registration Modification and Temporary Authorization Application Form for an MSW Facility

1. Reason for Submittal
<input checked="" type="checkbox"/> Initial Submittal <input type="checkbox"/> Notice of Deficiency (NOD) Response
2. Authorization Type
<input checked="" type="checkbox"/> Permit <input type="checkbox"/> Registration
3. Application Type
<input type="checkbox"/> Modification with Public Notice <input checked="" type="checkbox"/> Modification without Public Notice <input type="checkbox"/> Temporary Authorization (TA) <input type="checkbox"/> Modification for Name Change/Transfer
4. Application Fees
<input type="checkbox"/> Pay by Check <input checked="" type="checkbox"/> Online Payment If paid online, enter ePay Trace Number: 582EA000450426
5. Application URL
Is the application submitted for a permit/registration modification with public notice? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If the answer is "Yes", enter the URL address of a publicly accessible internet web site where the application and all revisions to that application will be posted in the space provided: http://
6. Confidential Documents
Does the application contain confidential documents? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If "Yes", cross-reference the confidential documents throughout the application and submit as a separate attachment in a binder clearly marked "CONFIDENTIAL."

7. General Facility Information

Facility Name: **Rock Prairie Road Landfill**
MSW Authorization No.: **1444C**
Regulated Entity Reference No.: **100830090**
Physical or Street Address (if available): **7600 Rock Prairie Road**
City: **College Station** County: **Brazos** State: **Texas** Zip Code: **77842**
(Area code) Telephone Number:
Latitude: **30.58** Longitude: **-96.25**

8. Facility Type(s)

Type I Type IV Type V
 Type I AE Type IV AE Type VI

9. Description of the Revisions to the Facility

Provide a brief description of all revisions to the permit/registration conditions and supporting documents referred by the permit/registration, and a reference to the specific provisions under which the modification/temporary authorization application is being made. Also, provide an explanation of why the modification/temporary authorization is requested:

The purpose of this permit modification request is to allow for the use of a Leachate Phyto-Utilization System using vetiver grass at the Rock Prairie Road Landfill.

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10. Facility Contact Information

Site Operator (Permittee/Registrant) Name: Brazos Valley Solid Waste Management Agency, Inc.

Customer Reference No. (if issued)*: CN600340194

Mailing Address: **P.O. Box 9960**

City: **College Station** County: **Brazos** State: **Texas** Zip Code: **77842-7960**

(Area Code) Telephone Number: **(979) 764-3878**

Email Address: **sbest@BVSWMA.com**

TX Secretary of State (SOS) Filing Number:

*If the Site Operator (Permittee/Registrant) does not have this number, complete a TCEQ Core Data Form (TCEQ-10400) and submit it with this application. List the Site Operator (Permittee/Registrant) as the Customer.

Operator Name¹: Same as Site Operator (Permittee/Registrant)

Customer Reference No. (if issued)*:

Mailing Address:

City: County: State: Zip Code:

(Area Code) Telephone Number:

Email Address:

Charter Number:

¹If the Operator is the same as Site Operator/Permittee type "Same as "Site Operator (Permittee/Registrant)".

*If the Operator does not have this number, complete a TCEQ Core Data Form (TCEQ-10400) and submit it with this application. List the Operator as the customer.

Consultant Name (if applicable): Weaver Consultants Group, LLC

Texas Board of Professional Engineers Firm Registration Number: **F-3727**

Mailing Address: **6420 Southwest Boulevard, Suite 206**

City: **Fort Worth** County: **Tarrant** State: **Texas** Zip Code: **76109**

(Area Code) Telephone Number: **817-735-9770**

E-Mail Address: **jedwards@wcgrp.com**

Agent in Service Name (required only for out-of-state):

Mailing Address:

City: County: State: Zip Code:

(Area Code) Telephone Number:

E-Mail Address:

11. Ownership Status of the Facility

Is this a modification that changes the legal description, the property owner, or the Site Operator (Permittee/Registrant)?

Yes No

If the answer is "No", skip this section.

Does the Site Operator (Permittee/Registrant) own all the facility units and all the facility property?

Yes No

If "No", provide the information requested below for any additional ownership.

Owner Name:

Street or P.O. Box:

City: County: State: Zip Code:

(Area Code) Telephone Number:

Email Address (optional):

Charter Number:

Signature Page

I, Bryan Griesbach, Executive Director,
(Site Operator (Permittee/Registrant)'s Authorized Signatory) (Title)

certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: Bryan Griesbach

Date: 9-24-21

TO BE COMPLETED BY THE OPERATOR IF THE APPLICATION IS SIGNED BY AN AUTHORIZED REPRESENTATIVE FOR THE OPERATOR

I, _____, hereby designate _____
(Print or Type Operator Name) (Print or Type Representative Name)

as my representative and hereby authorize said representative to sign any application, submit additional information as may be requested by the Commission; and/or appear for me at any hearing or before the Texas Commission on Environmental Quality in conjunction with this request for a Texas Water Code or Texas Solid Waste Disposal Act permit. I further understand that I am responsible for the contents of this application, for oral statements given by my authorized representative in support of the application, and for compliance with the terms and conditions of any permit which might be issued based upon this application.

Printed or Typed Name of Operator or Principal Executive Officer

Signature

SUBSCRIBED AND SWORN to before me by the said Bryan Griesbach

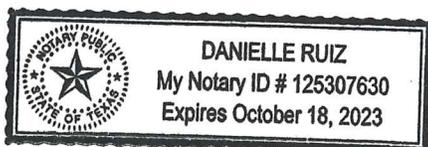
On this 24 day of Sept, 2021

My commission expires on the 18 day of Oct, 2023

Danielle Ruiz

Notary Public in and for
Brazos County, Texas

(Note: Application Must Bear Signature & Seal of Notary Public)



Facility Name: Rock Prairie Road Landfill
MSW Authorization #: 1444C

Initial Submittal Date: 09/01/2021
Revision Date:

Permit/Registration Modification with Public Notice

(See Instructions for P.E. seal requirements.)

Required Attachments

Attachment No.

Land Ownership Map

Land Ownership List

Marked (Redline/Strikeout) Pages

Unmarked Revised Pages

Additional Attachments as Applicable- Select all those apply and add as necessary

- Signatory Authority
- Fee Payment Receipt
- Confidential Documents

Facility Name: Rock Prairie Road Landfill
MSW Authorization #: 1444C

Initial Submittal Date: 09/01/2021
Revision Date:

Permit/Registration Modification without Public Notice or TA

(See Instructions for P.E. seal requirements.)

Required Attachments (for Modifications only)

Attachment No.

Marked (Redline/Strikeout) Pages

Unmarked Revised Pages

Additional Attachments as Applicable- Select all those apply and add as necessary

- Signatory Authority
- Fee Payment Receipt
- Confidential Documents

Permit/Registration Name Change/Transfer Modification

(See Instructions for P.E. seal requirements.)

Required Attachments

Attachment No.

TCEQ Core Data Form(s)

Property Legal Description

Property Metes and Bounds Description

Metes and Bounds Drawings

On-Site Easements Drawing

Land Ownership List

Land Ownership Map

Property Owner Affidavit

Verification of Legal Status

Evidence of Competency

Additional Attachments as Applicable- Select all those apply and add as necessary

- Signatory Authority
- Fee Payment Receipt
- Confidential Documents
- Final Plat Record of Property, if platted
- Assumed Name Certificate